

NEW PRODUCTS

2017

STREM

High Quality Chemicals for Research Since 1964



An Employee-owned Company

Innovative Products

We collaborate with academic and industrial innovators to make new technologies available to the research community around the world. This facilitates their commercial development and helps our customers achieve their goals.

We have used our expertise in organo-metallics and metal carbonyls to develop new metal-based nanomaterials. We have added quantum dots, surfactants for nano-synthesis and carbon-based products, such as graphene.

Our catalyst line has been expanded for metathesis, C-X coupling, C-C coupling, asymmetric hydrogenation, photocatalysis as well as other reactions. We have also added a range of biocatalysts, materials for battery applications and Metal Organic Framework products.

Our high purity precursor product line, including those for CVD and ALD applications, has also grown and new bubblers and cylinders have been added. DOT and UN approved configurations are now available as well as filling, refilling and cleaning services.

Many new products are introduced as a result of customer inquiries and suggestions.

If you don't find a product you need in our catalog, please ask us!



We sponsor the American Chemical Society Award for Distinguished Service in the Advancement of Inorganic Chemistry. Recent winners include: 2017 William B. Tolman, 2016 Vincent L. Pecoraro, 2015 Kim R. Dunbar.

We also sponsor the Canadian Society for Chemistry Award for Pure or Applied Inorganic Chemistry. Recent winners include: 2017 Dwight Seferos, 2016 Curtis P. Berlinguette, 2015 Murallee Murugesu.



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This 2017 release of our New Product Booklet features all new products which have been introduced since the last print of our Catalog 25 (2014-2016). Detailed listings, including pricing and availability for each product, can be viewed on our website.

Products in this booklet are sorted according to their Key Element. We have also included individual sections to highlight certain product categories such as Biocatalysts, Kits, Metal Organic Frameworks and Nanomaterials. An Index of Reaction Types is available at the end of this booklet for products used in catalysis.

Strem Chemicals is proud to be providing high quality specialty chemicals for research and development since 1964. Quality is paramount for all products and services that we offer. As part of our ongoing commitment to quality, Strem has achieved ISO 9001 certification for the Quality Management System (QMS) at its corporate headquarters.

Our first catalog featured metal carbonyls, metal catalysts and phosphine ligands. We have since expanded our product line to include inorganics, organometallics, chiral catalysts and ligands, electronic grade chemicals, precursors and equipment for CVD/ALD, ionic liquids, metal scavengers, nanomaterials and many more. Today we provide new technologies from around the globe. We have licensing agreements with industry and academia which allows easier access to these patent-protected products for our customers. We look forward to continued growth of our product line, in order to best serve our customers' needs with the quality and service they can trust from Strem.

Our other booklets, which focus on applications and product classes, are available in print per request and also on our website. Below is a list of current booklet titles that are available. Please also check our Product Resources section online to find additional literature offerings such as the Strem Chemiker, our technical publication, and product literature sheets.

- Buchwald Ligands and Precatalysts
- Gold Elements & Compounds
- Heterogeneous Catalysts
- Kits
- Materials for Energy Applications
- Metal Catalysts for Organic Synthesis
- MOCVD, CVD & ALD Precursors
- Nanomaterials
- New Products
- Other Ligands
- Phosphorous Ligands and Compounds
- PURATREM: High Purity Inorganics

Glossary of Terms

[α]_D	.....	Specific rotation
AAS	.....	Atomic Absorption Standard
ACS	.....	Conforms to American Chemical Society specifications
air sensitive	.....	Product may chemically react with atmospheric oxygen or carbon dioxide at ambient conditions. Handle and store under an inert atmosphere of nitrogen or argon.
amp	.....	Ampouled
b.p.	.....	Boiling point in °C at 760mm, unless otherwise noted
d.	.....	Density
dec.	.....	Decomposes
elec. gr.	.....	Electronig Grade, suitable for electronic applications
f.p.	.....	Flash point in °F
gran.	.....	Granular
heat sensitive	.....	Product may chemically degrade if stored for prolonged periods of time at ambient temperatures or higher. Store at 5°C or lower.
hydrate	.....	Unspecified water content which may vary slightly from lot to lot
hygroscopic	.....	Product may absorb water if exposed to the atmosphere for prolonged periods of time (dependent on humidity and temperature). Handle and store under an inert atmosphere of nitrogen or argon.
light sensitive	.....	Product may chemically degrade if exposed to light
liq.	.....	Liquid
m.p.	.....	Melting point in °C
moisture sensitive	.....	Product may chemically react with water. Handle and store under an inert atmosphere of nitrogen or argon.
NMR grade	.....	Suitable as a Nuclear Magnetic Resonance reference standard
optical grade	.....	For optical applications
powdr.	.....	Powder
primary standard	.....	Used to prepare reference standards and standardize volumetric solutions
PURATREM	.....	Product has a minimum purity of 99.99% (metals basis)
purified	.....	A grade higher than technical, often used where there are no official standards
P. Vol.	.....	Pore volume
pyrophoric	.....	Product may spontaneously ignite if exposed to air at ambient conditions
reagent	.....	High purity material, generally used in the laboratory for detecting, measuring, examining or analyzing other substances
REO	.....	Rare Earth Oxides. Purity of a specific rare-earth metal expressed as a percentage of total rare-earths oxides.
SA	.....	Surface area
store cold	.....	Product should be stored at -18°C or 4°C, unless otherwise noted (see product details)
subl.	.....	Sublimes
superconductor grade	.....	A high purity, analyzed grade, suitable for preparing superconductors
tech. gr.	.....	Technical grade for general industrial use
TLC	.....	Suitable for Thin Layer Chromatography
v.p.	.....	Vapor pressure mm of Hg
xtl.	.....	Crystalline

About Purity

Chemical purity	.....	is reported after the chemical name, e.g. Ruthenium carbonyl, 99%
Metals purity	.....	is reported in parentheses with the respective element, e.g. Gallium (III) bromide, anhydrous, granular (99.999%-Ga) PURATREM where 100% minus the metal purity is equal to the maximum allowable percentage of trace metal impurity

Ordering - USA

*We continue to do all that we can to make ordering easy.
Our friendly, knowledgeable staff is always ready to help.*

PLACING YOUR ORDER

Call our Toll-Free Number available within the U.S.A. and Canada. Our Customer Service Specialists are on duty to take your orders between 8:00 a.m. & 5:00 p.m. Eastern Time.

If placing an order after 5:00 p.m. Eastern Time, you may leave a message on our voicemail system. Your order will be processed and shipped the next day if the material is in stock. We will contact you to confirm price and delivery time.



PHONE: 1-978-499-1600

**Toll-Free # within the U.S.A. and Canada:
1-800-64-STREM (1-800-647-8736)**



FAX: 1-978-465-3104

**Toll-Free # within the U.S.A. and Canada:
1-800-51-STREM (1-800-517-8736)**



**MAIL TO: Strem Chemicals, Inc.
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Newburyport, MA 01950-4098**



**EMAIL: order@strem.com (product orders)
technical@strem.com (technical questions)
quotation@strem.com (special quote requests)
catalog@strem.com (catalog requests)
info@strem.com (all other inquiries)**



WEBSITE: www.strem.com

QUOTATIONS: Submit requests by phone, email or via the searchable catalog on our website.

U.S.A. ORDERS: Domestic orders are handled through our headquarters in Newburyport, Massachusetts. Our telephone, fax and email contact information are listed above. There is no minimum order. All orders are welcome regardless of size or value.

FOREIGN ORDERS: In some geographical areas, we have foreign sales representatives. In those areas, it is more convenient to place orders directly through them. Please contact us for the names of both our stocking and non-stocking representatives in other countries. They are well qualified to handle your inquiries and process your orders.

PLEASE INCLUDE THE FOLLOWING WHEN PLACING YOUR ORDER:

- 6-digit Customer Account #
- Catalog Number
- Chemical Name/Product Description
- Quantity
- Unit size (metric units)
- Preferred Shipping Method
- Shipping Address

Ordering - USA

SAME DAY SHIPPING: All U.S.A. orders placed between 8:00 a.m. and 2:30 p.m. Eastern Time will be shipped the same day, except for those items that are not in stock.

We will ship them in the fastest, most economical way. All shipments are insured for your protection against loss or damage in transit unless you specify otherwise. When complete shipments cannot be sent, partial shipments will be made at our discretion, unless specifically directed otherwise at the time the order is placed.

METHODS OF SHIPPING: Below is a list of the shipping services available in the U.S.A., Canada, and to foreign destinations. Please inform us if you have a preferred means of shipping.

U.S.A. & Canada

FedEx Ground
FedEx Express
Freight Truck*
United Parcel Service (UPS)
U.S. Mail (USPS)

Foreign Destinations

Air Freight
DHL
FedEx Express
International Express Mail
Ocean Freight*

***Some items sold are particularly hazardous (extremely toxic or pyrophoric) and cannot be shipped via FedEx Ground, Air, UPS or Parcel Post. These items must ship via freight truck which may cause shipping charges to be higher than usual. Customers will be notified if an item requires shipment via truck and has the right to request an estimate of the shipping costs.*

***For foreign orders, hazardous items described above will require shipment via ocean freight as they cannot be shipped by air. Travel via ocean freight may have extended transit times as well as higher shipping costs. Customers will be notified if an item requires shipment via ocean freight and has the right to request an estimate of the shipping costs.*

SHIPPING RESTRICTIONS: Chemicals covered by 49 CFR, IATA and IMO shipping restrictions will be shipped accordingly. Any shipping restrictions that apply to a particular chemical are listed below the catalog number. An explanation of each is as follows:

HAZ This material is hazardous and cannot be shipped via mail or DHL.



For U.S.A. and Canada, this material must be shipped via freight truck.



For International Shipments, this material must be shipped via ocean freight.

PACKAGING: Air-sensitive materials are packaged under argon in wax-sealed bottles, in ampoules or in cylinders. We suggest that these materials be opened, used and stored under an inert atmosphere to maintain their integrity and ensure maximum shelf life. Products packaged in ampoules will be designated by the letters "amp" appearing below the catalog number.

SPECIAL PACKAGING: Special packaging may be required for the shipment of poisons (Division 6.1), or water-reactives (Division 4.3). We add a surcharge of \$14.00 per package for such shipments. We also apply a \$12.00 surcharge for materials requiring five-gallon shipping pails. We reserve the right to increase these charges as our cost for these special packaging materials increase. Other special packaging materials may also incur a surcharge.

PRICES: We reserve the right to make price changes at any time. In the event the price increase is more than ten percent (10%), we will contact the customer before shipment.

Quantities intermediate to the listed standard packages will be priced at the smaller standard package rate. Ampouled materials will be sold only in the listed standard sizes.

We accept the following credit cards:



Ordering - USA

In the event the larger catalog units are temporarily out of stock, our order policy is to ship multiple smaller units at the reduced larger unit price. Ampouled materials are exempted from this policy and will be sold only at the listed catalog prices, but are eligible for multiple unit discounts.

DISCOUNTS: Any product ordered in multiple lots, whether in standard, smaller-than-standard, or intermediate quantities is eligible for the following discounts:

5-9 units	Less 5% from catalog price
10-19 units	Less 10% from catalog price
20 or more units	Inquire

BULK QUANTITIES: Many of our products are available in bulk at substantially lower prices. Please contact our Sales Department for these special prices.

CUSTOM MANUFACTURING: Strem may be able to supply materials not listed in this catalog on a custom basis and would be pleased to evaluate your requirements.

cGMP MANUFACTURING: Current Good Manufacturing Practices (cGMP) kilo-lab facilities are available for pharmaceutical manufacturing. Complete documentation can be provided. Active Drug Master Files (DMFs) are maintained.

NOMENCLATURE: Strem Chemicals has adopted the systematic names recommended by IUPAC with Stock's designation (Roman numerals in parentheses) of oxidation states for most of our compounds. However, in some cases where a traditional name of commerce has become widely used and recognized, we have opted to use the common name. We have also retained the classical names for most organometallics.

The water of hydration of an inorganic product is expressed in the assigned product name using the terms mono-, di-, tri-hydrate, etc. Products having indefinite waters of hydration which may vary from lot to lot have been called "hydrate."

RETURN POLICY: If you wish to return an unopened product, we will do our best to accommodate your request. Please contact us first for a return material authorization number and specific shipping instructions.

There may be a 20% restocking charge, subject to a \$20.00 minimum, assessed on any unopened returned items. Of course, this charge will not apply to items returned due to a shipping error on our part.

TERMS: Our usual terms are net 30 days, FCA Newburyport, Massachusetts. Strem Chemicals also accepts VISA, Master Card and American Express for payment of orders.

GENERAL TERMS AND CONDITIONS: All sales are subject to our Standard Terms and Conditions available at www.strem.com.

Notice To Our Customers

All of the chemicals in this catalog are research chemicals as defined under the Toxic Substances Control Act. As such, they should be used or handled only by or under the direct supervision of "technically qualified individuals," as defined in 40CFR 710.3.

The chemical, physical and toxicological properties have not been fully investigated since these research chemicals are for investigational use only. Strem Chemicals, therefore, makes no guarantee of results and assumes no liability for injuries, damages or penalties resulting from their use, since the conditions of handling and use are beyond our control. Suggestions and recommendations for their use are not to be taken as a license to operate under or to infringe any patent.

Commande - Europe (Français)

Nous faisons notre possible pour faciliter vos commandes.

Notre aimable personnel se tient à votre disposition pour vous aider.



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Website: www.strem.com

Strem Chemicals, Inc.

15, rue de l'Atome Z.I.

67800 BICHHEIM (France)

CONDITIONS DE VENTE

Toutes nos conditions de vente sont disponibles sur le site www.strem.com.

COMMENT PASSER VOS COMMANDES

Pour éviter toute erreur dans l'exécution de votre commande, veuillez mentionner le N° de référence indiqué sur le côté gauche du catalogue, le nom chimique du produit ainsi que la quantité désirée.

LES PRIX

Nous réservons le droit de modifier les prix à n'importe quel moment, si besoin est. Dans le cas où l'augmentation de prix serait supérieure à 10%, nous contacterons nos clients pour accord, avant livraison.

Pour les commandes de plusieurs unités d'un même produit, et quel qu'en soit le conditionnement, nous accordons les remises suivantes:

5 à 9 unités

10 à 19 unités

20 unités, et plus

remise de 5% sur le prix catalogue

remise de 10% sur le prix catalogue

veuillez nous interroger

BULK

La plupart de nos produits peuvent être fournis en grandes quantités à des prix avantageux. Veuillez consulter notre Service Commercial pour cotation. Ces demandes peuvent être transmises par fax, email ou par le biais de notre site internet www.strem.com.

VEUILLEZ PRÉCISER:

- | | |
|---------------------------------|---|
| ▪ le N° de référence du produit | ▪ l'unité |
| ▪ le nom chimique du produit | ▪ votre code client si vous le connaissez |
| ▪ la quantité | ▪ votre N° de TVA (VAT) |

SYNTHÈSE SUR MESURE

Nous avons également la possibilité de vous fournir certains produits ne figurant pas dans notre catalogue. Nous serons heureux de vous communiquer nos conditions.

Notre laboratoire GMP nous donne la possibilité de faire des synthèses pharmaceutiques sur mesure.

Les installations permettant la mise en oeuvre des techniques usuelles de fabrication de produits (cGMP) en laboratoire à l'échelle du kilogramme sont disponibles pour les fabrications pharmaceutiques. Une documentation complète peut être fournie sur demande. Les fichiers permanents actualisés de produits pharmaceutiques (DMF) sont maintenus.

DÉNOMINATION

Nous avons adopté les noms usuels, tels qu'ils sont recommandés par l'IUPAC, avec mention de consignes de stockage pour la plupart de nos produits. Cependant, dans le cas où un nom commun pour un produit serait entré en usage d'une manière très large, nous avons opté pour la dénomination du produit par son nom commun.

Nous avons également retenu les désignations classiques pour la plupart de nos composés organo-métalliques. L'eau d'hydratation d'un composé inorganique est désignée par : mono-, di-, tri-hydrate, etc., en regard du produit concerné.

Les produits incluant des eaux d'hydratation imparfaitement définies et susceptibles de variations d'un lot à l'autre, seront simplement désignés par "Hydrates".

EMBALLAGE

Les matériaux sensibles à l'air sont conditionnés sous Argon dans des bouteilles ou ampoules scellées à la cire.

Les produits conditionnés en ampoules seront suivis de l'abréviation "AMP" en dessous de notre N° de référence catalogue.

Nous suggérons que ces produits soient ouverts, utilisés et stockés en atmosphère inerte, afin de leur maintenir leurs propriétés et leur assurer la plus longue conservation possible.

LIVRAISONS

Les commandes sont traitées à réception et expédiées au plus vite.

Les commandes de produits n'étant pas disponibles en totalité, feront l'objet d'une expédition partielle sur demande.

MODE DE TRANSPORT:

HAZ Ces produits ne sont pas acceptés par la poste



Livraison par transporteur spécial

FRAIS DE TRANSPORT

LIVRAISON EN FRANCE:

Les livraisons ne nécessitant pas de transport spécial et dont le montant est supérieur à 150€ net HT seront gratuites.

Pour toute commande inférieure à ce montant, une participation de 10€ sera demandée. Les livraisons nécessitant un transport spécial seront à la charge de l'acheteur après information et accord.

A la réception, veuillez à comparer le contenu du colis avec le bulletin de livraison et nous signaler toute différence le plus tôt possible.

RETOUR DE MARCHANDISES

Veuillez-nous contacter pour accord et instructions concernant le renvoi. Les produits devront nous être retournés dans leur emballage d'origine et non ouverts.

PAIEMENT:

Lors de vos paiements veuillez préciser le numéro de facture.

Nos conditions de paiement sont : 30 jours net.

Les marchandises restent notre propriété jusqu'au paiement intégral de la facture.

LIEU DE JURIDICTION: STRASBOURG

Note Importante

Tous les produits figurant dans ce catalogue sont destinés à la recherche, selon la définition figurant dans le TSCM.

Ils ne pourront être utilisés ou manipulés que par des personnes dûment habilitées, ou sous le contrôle strict d'un technicien qualifié.

Les effets chimiques, physiques et toxiques, n'ont encore pu être déterminées clairement puisqu'il s'agit de produits destinés à la recherche. Leurs propriétés ne pourront être constatées qu'ultérieurement. De ce fait, STREM CHEMICALS ne peut offrir aucune garantie quant aux résultats, et ne peut en aucun cas être tenu pour responsable pour d'éventuels dommages, blessures, détériorations, etc., qui pourraient résulter de la manipulation des produits étant donné qu'elle s'effectue sous votre responsabilité.

Les suggestions et recommandations que nous fournissons quant à leur usage ne sont données qu'à titre purement indicatif, et ne devront en aucun cas servir à enfreindre la réglementation, dans le cas d'un produit protégé par un dépôt de brevet.

Bestellung - Europa (Deutsch)

*Wir bemühen uns, Ihnen das Bestellen so einfach wie möglich zu machen.
Sollten Sie Fragen haben, steht Ihnen unser freundliches Personal gerne jederzeit zur Verfügung.*



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VERKAUFS- UND LIEFERBEDINGUNGEN

Die geltenden Verkaufsbedingungen finden Sie auf www.strem.com.

PREISE UND ZAHLUNG

Die Preise verstehen sich in Euro inklusive Innen und Außenverpackung.

Bei Zahlungen bitte geben Sie die Rechnungsnummer an.

Aufgrund der sich ständig ändernden Marktsituation insbesondere hinsichtlich der Preise von Lieferanten aus anderen Währungsgebieten, die bei Kursschwankungen entsprechend angepaßt werden, sind die Preise freibleibend.

Rechnungen werden nur durch uns gestellt und sind ausschließlich an uns zu bezahlen.

Unsere Rechnungen werden sofort nach Rechnungseingang fällig und können innerhalb von 30 Tagen nach Lieferung bezahlt werden.

Die nicht rechtzeitige Zahlung einer Lieferung oder begründete Zweifel an der Zahlungsfähigkeit oder Kreditwürdigkeit des Bestellers können wir zum Anlaß nehmen, sämtliche Forderungen gegen den Besteller sofort fällig zu stellen und weitere Lieferungen nur gegen Vorkasse zu erbringen.

Der Besteller ist nicht berechtigt, gegenüber unseren fälligen Zahlungsansprüchen ein Zurückbehaltungsrecht geltend zu machen; er kann gegenüber unseren Forderungen nur mit unbestrittenen oder rechtskräftig festgestellten Forderungen aufrechnen.

MENGENRABATTE

Für fünf bis neun Packungen des gleichen Produktes gewähren wir 5% Rabatt, für zehn bis neunzehn Packungen 10% Rabatt auf den derzeit gültigen Katalogpreis. Bei größeren Mengen bitten wir um Ihre Anfrage.

BULKMENGEN

Viele unserer Produkte können wir auch in Großpackungen zu niedrigeren Preisen anbieten. Bitte erkundigen Sie sich bei uns nach diesen Sonderpreisen. Wir bitten um Ihre Anfrage per fax, email oder über unserer Webseite www.strem.com.

UM FEHLER ZU VERMEIDEN BESTELLEN SIE BITTE UNTER ANGABE:

- der Artikelnummer
- der Einheit
- des Chemikaliennamens
- der Kunden Nr. wenn bekannt
- der Menge
- der Ust. Id. Nr

Bestellung - Europa (Deutsch)

KUNDENSYNTHESE

Viele nicht in diesem Katalog aufgeführten Verbindungen können wir als Kundensynthese herstellen. Unser Schwerpunkt liegt im Bereich der metallorganischen Synthese. Bitte fragen Sie bei Bedarf nach unseren Möglichkeiten. Für die Herstellung pharmazeutischer Produkte im kg-Masstab haben wir ein cGMP-Labor (Current Good Manufacturing Practices) verfügbar.

NOMENKLATUR

Für die meisten unserer Produkte haben wir die systematischen Namen übernommen, wie sie von der IUPAC empfohlen werden. Wenn jedoch Trivialnamen üblich und gebräuchlich sind, haben wir diese verwendet. Für die meisten metallorganischen Verbindungen haben wir ebenfalls die in der Fachliteratur üblichen Bezeichnungen übernommen. Der Kristallwassergehalt bei anorganischen Salzen wird durch den Zusatz "mono-, di-, trihydrate" usw. ausgedrückt. Produkte mit unbestimmten oder wechselnden Kristallwassergehalt werden nur als "Hydrate" bezeichnet.

VERPACKUNG

Luftempfindliche Produkte sind unter Argon oder Stickstoff in verwachsenen oder in Ampullen verpackt. Diejenigen unserer Produkte, die in Ampullen verpackt sind, werden im vorliegenden Katalog mit den Buchstaben "Amp." unterhalb der Katalog-nummer bezeichnet. Wir empfehlen, diese Produkte nur unter inertem Gasatmosphäre zu öffnen und zu benutzen, um eine Zersetzung oder gefährliche Reaktionen zu vermeiden. Ansonsten sind unsere Produkte handelsüblich verpackt.

LIEFERUNG

Bei Bestellungen von Chemikalien, die nicht vollständig verfügbar sind, können wir auf Anfrage Teillieferungen durchführen.

Gefahrguthinweise:

HAZ Gefahrgut - kein Versand per Post möglich



Spezialtransport

Lieferung innerhalb von Deutschland:

Die Lieferungen, die keinen besonderen Transport benötigen und einen Betrag von 150€ netto übersteigen, werden frei Haus geliefert. Bei Bestellungen unter diesem Betrag, wird eine Gebühr in Höhe von 10€ erhoben.

Die Gebühren für die Lieferungen, die einen besonderen Transport benötigen, werden dem Einkäufer nach Informationen und Zustimmung weiterberechnet.

Lieferung in anderen Ländern:

Der Besteller wird mit den entsprechenden Frachtkosten belastet ausgenommen es besteht eine besondere Vereinbarung.

VERSAND

Besondere Versandwünsche des Bestellers berücksichtigen wir, soweit dies im Rahmen der gesetzlichen Vorschriften gestattet ist. Mehrkosten für Eillieferungen gehen zulasten des Bestellers.

Die Gefahr des zufälligen Untergangs und der zufälligen Verschlechterung der Ware geht mit der Absendung der Ware oder ihrer Auslieferung an den Versandbeauftragten, spätestens aber mit Verlassen des Werkes oder des Lagers auf den Besteller über. Ist für den Versand eine besondere Weisung des Bestellers abzuwarten, geht die Gefahr auf diesen mit der Anzeige der Versandbereitschaft über.

Bestellung - Europa (Deutsch)

Beim Wareneingang, bitten wir Sie den Inhalt des Pakets mit dem Lieferschein zu vergleichen und einen Unterschied so schnell wie möglich zu melden.

WARENRÜCKSENDUNG

Bitte kontaktieren Sie uns für die Genehmigung und Anweisungen auf die Rückkehr. Die Produkte müssen in ihrer Originalverpackung und ungeöffnet zurückgeschickt werden.

AUSSCHLUß VON SCHADENERSATZANSPRÜCHEN

Die chemischen, physikalischen und toxikologischen Eigenschaften vieler unserer Produkte sind noch nicht vollständig erforscht, da diese Forschungsschemikalien ausschließlich für wissenschaftliche Zwecke bestimmt sind. Die Prüfung, ob ein bestimmtes Produkt für die Verwendung des Bestellers geeignet ist, obliegt alleine diesem. Die Verantwortung für die Anwendung im medizinischen Bereich, im Haushalt, als Futtermittel oder Lebensmittelzusatz liegt allein beim Besteller. Für Verletzungen oder Unfälle, die durch die Lagerung oder Handhabung unserer Produkte entstehen, übernehmen wir keine Haftung, da sie außerhalb unserer Kontrolle liegen. Technische Informationen geben wir gerne weiter. Doch können wir keine Verantwortung für die Ergebnisse des Kunden übernehmen.

Sämtliche Schadenersatzansprüche des Bestellers (einschließlich aller Ansprüche auf Ersatz von Aufwendungen, Kosten etc.), insbesondere wegen Leistungsverzugs, Unvermögens oder Unmöglichkeit, wegen des Fehlens zugesicherter Eigenschaften, positiver Forderungsverletzungen, Verschuldens bei Vertragsabschluß, wegen jeglicher Erklärungen oder unterlassener Erklärungen unsererseits oder wegen unerlaubter Handlung (einschließlich etwaiger Produzentenhaftung), insbesondere auch Ansprüche auf Ersatz von Schäden, Kosten und Aufwendungen, die nicht an den Produkten selbst entstanden sind (Folgeschäden), sind ausgeschlossen, es sei denn sie beruhen auf Vorsatz oder grober Fahrlässigkeit. Soweit von uns Schadenersatz verlangt werden kann, sind wir nur verpflichtet, den bei Vertragsabschluß vorhersehbaren Schaden zu ersetzen.

EIGENTUMSVORBEHALT

Die Ware bleibt bis zur vollen Bezahlung sämtlicher Forderungen einschließlich Nebenforderungen, künftig entstehende Forderungen und Einlösungen von Scheck und Wechseln unser Eigentum.

RECHT UND GERICHTSSTAND

Straßburg - Frankreich

Wichtiger Hinweis

Alle Produkte in diesem Katalog sind für die Forschung bestimmt sind, gemäß der Definition in der TSCM.

Sie dürfen nicht von dazu ermächtigten Personen oder unter der strengen Aufsicht eines qualifizierten Techniker verwendet oder verarbeitet werden.

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Ordering - UK

*We continue to do all that we can to make ordering easy.
Our friendly, knowledgeable staff is always ready to help.*

All UK orders should be directed to:



Tel.: +44 1 223 873028

Fax: +44 1 223 870207

Email: enquiries@strem.co.uk

Website: www.strem.co.uk

Strem Chemicals UK Ltd.
Newton Hall
Town Street
Newton, Cambridge
CB22 7ZE

QUOTATIONS: Submit requests by email, fax or via our website.

MINIMUM ORDER: No minimum order is required. All orders are welcomed regardless of size or value. Low value orders may incur a small packing and delivery charge.

HOW TO ORDER: Please order by both chemical name and catalogue number to ensure receipt of the product you want. Also please specify the quantity and the size in metric units. Orders received in non-metric lots will be processed to the nearest listed metric lot.

DELIVERY: Typically, we can deliver items next day, if in stock in the UK. We receive two shipments per week for stock available at Strem USA. This offers a lead time of 3-5 working days for delivery depending on the day that an order is placed. Drop shipment is available at an additional cost if a faster service is required. Contact us for estimates. Please check the website for estimated delivery times. (Lead times listed on the website does not apply for chemicals which need to be shipped via ocean freight. Please contact us for more details on these items.)

SHIPPING RESTRICTIONS:

HAZ This material is hazardous and cannot be shipped by mail.



In the UK this material must be shipped by freight truck.



For international shipments, this material must be shipped by ocean freight.

PLEASE INCLUDE THE FOLLOWING WHEN PLACING YOUR ORDER:

- | | |
|-------------------------------------|-----------------------------|
| • Customer Account # | • Unit size (metric units) |
| • Catalogue Number | • Preferred Shipping Method |
| • Chemical Name/Product Description | • Shipping Address |
| • Quantity | |

PACKAGING: Air sensitive materials are packaged under argon in a wax-sealed bottle, ampoule or in cylinders. Those products packaged in an ampoule will be designated by the letters "amp" appearing below the catalogue number. We suggest that these materials be opened, used and stored in an inert atmosphere to maintain their integrity and ensure maximum shelf life.

Ordering - UK

SPECIAL PACKAGING: Certain chemicals, such as poisons and highly flammable materials require special packaging. We reserve the right to charge for these costs dependent on the order value.

PRICES: We reserve the right to make price changes at any time. Prices will be reviewed in the event that there is a significant change in exchange rate or base costs. Please check website for up-to-date pricing. We will always contact the customer prior to shipment in the event of a difference in price between the customer's order and the website.

Quantities intermediate to the listed standard packages will be priced at the smaller standard package rate. Ampouled materials will only be sold in the standard packages.

In the event the larger catalogue units are temporarily out of stock, our order policy is to ship multiple smaller units at the reduced larger price. However ampouled materials are exempted from this policy and will be sold only at the listed catalogue prices, but are subject to multiple unit discounts.

DISCOUNTS: Any product ordered in multiple lots, whether in standard, smaller-than-standard or intermediate quantities is eligible for the following discounts:

5-9 units	Less 5% from catalogue price
10-19 units	Less 10% from catalogue price
20 or more units	Inquire

BULK QUANTITIES: Many of our products are available at substantially lower prices. Please contact us for these special prices.

CUSTOM MANUFACTURING: Strem Chemicals may be able to supply materials not listed in this catalogue on a custom basis and would be pleased to evaluate your requirements.

cGMP MANUFACTURING: Current Good Manufacturing Practices (cGMP) kilo-lab facilities are available for pharmaceutical manufacturing. Complete documentation can be provided. Active Drug Master Files (DMFs) are maintained.

NOMENCLATURE: Strem Chemicals has adopted the systematic names adopted by IUPAC with Stock's designation (Roman numeral in parentheses) of oxidation states for most of our compounds. However, in some cases where a traditional name of commerce has become widely used and recognized, we have opted to use the common name. We have also retained the classical name for most organometallics.

The water of hydration of an inorganic product is expressed in the assigned product names using the terms mono-, di-, tri-hydrate etc. Products having indefinite waters of hydration which may vary from lot to lot have been called simply "hydrate".

RETURN SHIPMENTS: If you wish to return a product we will do our best to accommodate you. Please contact us first for return permission and shipping instructions. Unless we are aware that you are returning an item and expect your shipment, it could be misdirected and lost.

There may be a 20% restocking charge, subject to a £20 minimum, assessed on any unopened items. Of course this charge will not apply to items returned due to a shipping error on our part.

TERMS: Our usual terms are net 30 days, F.O.B. Cambridge. We also accept Visa and Mastercard for payment of orders.

We accept the following credit cards:



Notice To Our Customers

All of the chemicals in this catalogue are research chemicals as defined under the United States Toxic Substances Control Act, and hazard identified via GHS/CLP regulations. As such, they should be used or handled only by or under the direct supervision of "technically qualified individuals," in accordance with national regulations such as COSHH, 40CFR 710.3 etc.

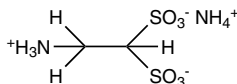
The chemical, physical and toxicological properties have not been fully investigated since these research chemicals are for investigational use only. Strem Chemicals, therefore, makes no guarantee of results and assumes no liability for injuries, damages or penalties resulting from their use, since the conditions of handling and use are beyond our control. Suggestions and recommendations for their use are not to be taken as a license to operate under or to infringe any patent.

ALUMINUM (Compounds)

13-1315	Aluminum oxide powder, surface area 6 m²/g, 99% (Grade APS 1 micron) (1344-28-1)	250g 1kg
NEW	Al ₂ O ₃ ; FW: 101.96; white solid	

AMMONIUM (Compounds)

02-0570	Ammonium 2-aminoethane-1,1-di-sulfonic acid hydrate, min. 95% (1235825-84-9)	1g 5g
NEW	C ₂ H ₁₀ N ₂ O ₆ S ₂ ; FW: 222.24; white powdr.; m.p. 57-60°	



Technical Note:

1. This di-sulfonated building block is recommended for post-synthetic water-solubilization of hydrophobic, molecules for applications in biological media, especially organic dyes, fluorophores, azo dyes^[1], bodipy^[2], coumarin^[3] and xanthene dyes^[4]. This includes organic supramolecular compounds such as cryptophanes^[5], through aminolysis reactions of activated esters, activated carbamates (or carbonates) and isothiocyanates. Such reactions can be performed either in aqueous media (Schotten-Baumann conditions), or in anhydrous organic media (by converting this di-sulfonated taurine analog into the corresponding tributylammonium or tetrabutylammonium salt^[2,4]). Such methodology is also applicable for sulfonation of biomolecules such as peptides and nucleic acids, for fine-tuning their net electric charge^[6]. A further derivatization of this unusual amine with 3-azidopropanoic acid, 3-mercaptopropanoic acid, or 4-pentynoic acid, provides a di-sulfonated linker that is reactive in either "click" reactions (1,3-dipolar cycloadditions), SNAr or Sonogashira cross-couplings^[1].

References:

1. *Chem.-Eur. J.*, **2013**, *19*, 1686
2. *New J. Chem.*, **2013**, *37*, 1016
3. *Dyes Pigm.*, **2014**, *110*, 270
4. *Tetrahedron Lett.*, **2010**, *51*, 3304
5. *Chem. Commun.*, **2011**, *47*, 9702
6. *Bioconjugate Chem.*, **2014**, *25*, 1000

26-3765	Tetramethylammonium ferricyanide, 98% (14591-44-7)
	See page 34

BARIUM (Compounds)

56-8450	Bis(pentamethylcyclopentadienyl)barium, 98% (112379-49-4)	500mg 2g
NEW	C ₂₀ H ₃₀ Ba; FW: 407.78; white solid	
amp	air sensitive, moisture sensitive	
HAZ		

Technical Note:

1. Barium precursor for Atomic Layer Deposition and Chemical Vapor Deposition (ALD/CVD)

References:

1. *J. Phys. Chem. A*, **2007**, *111*, 8147

BIOCATALYSTS (Compounds)

06-3110	Alcalase® 2.4 L FG (9014-01-1)	10g 50g 250g
NEW	brown liq.; d. 1.17 (store cold)	
	Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 2.4 AU-A/g. Serine endoprotease that hydrolyzes internal peptide bonds. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	

BIOCATALYSTS (Compounds)

06-3112	NEW	Alcalase® 2.5 L (9014-01-1) amber liq. (semitransparent); d. 1.08 (store cold) Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 2.5 AU-A/g. Serine endoprotease that hydrolyzes internal peptide bonds. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	10g
			50g 250g
07-3155	NEW	CalB immo 1090™ - Immobilized enzyme white to slightly yellow spherical beads, dry (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 1 year; Particle Size: 300-710 micron; CalB immo 1090 is an adsorbed preparation and is suitable for applications in solvent-free systems like oils, as well as organic solvents and it and can be used for (regio- and stereoselective) esterifications and transesterifications. CalB Immo 1090 has many advantages including high activity and the possibility to use in oils, organic solvent and bi-phasic systems. Sold in collaboration with Purolite for research purposes only.	10g
			50g 250g
07-3152	NEW	CalB immo 5587™ - Immobilized enzyme white to slightly yellow spherical beads, dry (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 1 year; Particle Size: 300-710 micron; CalB immo 5587 is an adsorbed preparation and is particularly suitable for applications where cost is an essential parameter, like biodiesel or industrial oil manufacture. CalB Immo 5587 has many advantages including cost-effectiveness in processes like biodiesel manufacture. It is also a highly robust carrier, particularly suitable for column configurations. Sold in collaboration with Purolite for research purposes only.	10g
			50g 250g
07-3159	NEW	CalB immo 5872™ - Immobilized enzyme white to slightly yellow spherical beads, dry (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 1 year; Particle Size: 300-1500 micron; CalB immo 5872 is an adsorbed preparation and is suitable for applications in solvent-free systems like oils, as well as organic solvents and it and can be used for (regio- and stereoselective) esterifications and transesterifications. CalB Immo 5872 has many advantages including cost-effectiveness and the possibility to use in oils, organic solvent and bi-phasic systems. Sold in collaboration with Purolite for research purposes only.	10g
			50g 250g
07-3142	NEW	CalB immo 8285™ - Immobilized enzyme white to slightly yellow spherical beads, dry (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 1 year; Particle Size: 100-710 micron; CalB immo 8285 is covalently immobilized and is suitable for applications in water, organic solvents as well as solvent-free systems and can be used for (regio- and stereoselective) hydrolysis, esterifications and transesterifications. The lipase is immobilized by covalent immobilization onto Purolites highly hydrophobic carrier Purolite ECR8285 (an epoxy/butyl methacrylate co-polymer). Sold in collaboration with Purolite for research purposes only.	10g
			50g 250g
07-3148	NEW	CalB immo 8806™ - Immobilized enzyme white to slightly yellow spherical beads, dry (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 1 year; Particle Size: 300-710 micron; CalB immo 8806 is an adsorbed preparation and is suitable for applications in solvent-free systems like oils, as well as organic solvents and it and can be used for (regio- and stereoselective) esterifications and transesterifications. CalB Immo 8806 has many advantages including high activity and the possibility to use in oils, organic solvent and bi-phasic systems. Sold in collaboration with Purolite for research purposes only.	10g
			50g 250g

BIOCATALYSTS (Compounds)

96-4050	CalB immo KIT™ - Immobilized enzyme See page 38	
07-3130	CalB immo Plus™ - Immobilized enzyme white to off white spherical beads, dry (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 1 year; Particle Size: 300-710 micron; CalB immo Plus is suitable for applications in organic solvents as well as solvent-free systems and can be used for (regio- and stereoselective) esterifications and transesterifications. CalB Immo Plus has many advantages including high activity and high mechanical stability. Sold in collaboration with Purolite for research purposes only.	10g 50g 5x50g
NEW		
07-3133	CalB immo Plus Food Grade™ - Immobilized enzyme white to slightly yellow spherical beads, dry (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 1 year; Particle Size: 300-710 micron; CalBimmo Plus Food Grade is supplied in food-grade quality and conforms to the General Specifications and Considerations for Enzyme Preparations Used in Food Processing of the Joint FAO/WHO Expert Committee on Food Additives (JECFA). CalB immo Plus is suitable for applications in organic solvents as well as a solvent-free systems and can be used for (regio- and stereoselective) esterifications and transesterifications. CalB Immo Plus has many advantages including high activity and high mechanical stability. Sold in collaboration with Purolite for research purposes only.	10g 50g 5x50g
NEW		
06-0925	Enzyme carrier Lifetech™ ECR1030M White to off white spherical beads (wet); SA: 80 - 120 m ² /g (store cold) Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-710 micron; Pore Diameter: 220-340; Lifetech ECR1030M is a copolymer of divinylbenzene (DVB) and methacrylate with no functional groups. It is used for enzyme immobilization by adsorption (hydrophobic interaction) and it is particularly suitable for lipase immobilization such as CALB. Lifetech ECR1030M main features are high mechanical stability compared to other existing resins, low surface area that grants high enzyme activity at low protein loading. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
NEW		
07-2215	Enzyme carrier Lifetech™ ECR1504 White to off white spherical beads (wet) (store cold) Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1200 micron; Lifetech ECR1504 is a copolymer of divinylbenzene (DVB) and styrene functionalised with tertiary amines. It is used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the tertiary amines on the polymer. It is particularly suitable for immobilization of enzymes with iP in the range 3 - 5 like many glycosidases. Lifetech ECR1504 main features are possibility to regenerate the resin, pH adjustment before immobilization and large particle size for column applications. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
NEW		
07-2220	Enzyme carrier Lifetech™ ECR1508 White to off white spherical beads (wet) (store cold) Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1200 micron; Lifetech ECR1508 is copolymer of divinylbenzene (DVB) and styrene functionalised with tertiary amines. It is used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the tertiary amines on the polymer. It is particularly suitable for immobilization of enzymes with iP in the range 3 - 5 like many glycosidases. Lifetech ECR1508 main features are possibility to regenerate the resin, pH adjustment before immobilization and large particle size for column applications. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
NEW		

BIOCATALYSTS (Compounds)

07-2224	Enzyme carrier Lifetech™ ECR1604	50g
NEW	White to off white spherical beads (wet) (store cold)	5x50g
	Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1200 micron; Lifetech ECR1604 is a copolymer of divinylbenzene (DVB) and styrene functionalised with quaternary amines. It is used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the tertiary amines on the polymer. It is particularly suitable for immobilization of enzymes with iP in the range 3 - 5 like many glycosidases. Lifetech ECR1604 main features are possibility to regenerate the resin, pH adjustment before immobilization and large particle size for column applications. Sold in collaboration with Purolite for research purposes only.	
07-2230	Enzyme carrier Lifetech™ ECR1640	50g
NEW	White to off white spherical beads (wet) (store cold)	5x50g
	Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1200 micron; Lifetech ECR1640 is a copolymer of divinylbenzene (DVB) and styrene functionalised with quaternary amines. It is used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the tertiary amines on the polymer. It is particularly suitable for immobilization of enzymes with iP in the range 3 - 5 like many glycosidases. Lifetech ECR1640 main features are possibility to regenerate the resin, pH adjustment before immobilization and large particle size for column applications. Sold in collaboration with Purolite for research purposes only.	
06-0928	Enzyme carrier Lifetech™ ECR1061M	50g
NEW	White to off white spherical beads (wet); SA: 400 - 510 m ² /g (store cold)	5x50g
	Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-710 micron; Pore Diameter: 600-750; Lifetech ECR1030M is a copolymer of divinylbenzene (DVB) and methacrylate with no functional groups. It is used for enzyme immobilization by adsorption (hydrophobic interaction) and it is particularly suitable for lipase immobilization such as CALB. Lifetech ECR1030M main features are high mechanical stability compared to other existing resins, low surface area that grants high enzyme activity at low protein loading. Sold in collaboration with Purolite for research purposes only.	
06-0905	Enzyme carrier Lifetech™ ECR1090F	50g
NEW	White to off white spherical beads (wet); SA: 750 - 850 m ² /g (store cold)	5x50g
	Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 150-300 micron; Pore Diameter: 900-1100; Lifetech ECR1090F is a copolymer of divinylbenzene (DVB) and styrene with high porosity and no functional groups. It is used for enzyme immobilization by adsorption (hydrophobic interaction) and it is particularly suitable for lipase immobilization. Lifetech ECR1090F main features are high porosity, high mechanical stability and high surface area. Sold in collaboration with Purolite for research purposes only.	
06-0913	Enzyme carrier Lifetech™ ECR1090M	50g
NEW	White to off white spherical beads (wet); SA: 750 - 850 m ² /g Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-710 micron; Pore Diameter: 900-1100; Lifetech ECR1090M is a copolymer of divinylbenzene (DVB) and styrene with high porosity and no functional groups. It is used for enzyme immobilization by adsorption (hydrophobic interaction) and it is particularly suitable for lipase immobilization. Lifetech ECR1090M main features are high porosity, high mechanical stability and high surface area. Sold in collaboration with Purolite for research purposes only.	5x50g

BIOCATALYSTS (Compounds)

06-0922 NEW	Enzyme carrier Lifetech™ ECR1091M White to off white spherical beads (wet); SA: > 450 m ² /g <i>(store cold)</i> Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-710 micron; Pore Diameter: 950-1200; Lifetech ECR1091M is a copolymer of divinylbenzene (DVB) and styrene with very high porosity and no functional groups. It is used for enzyme immobilization by adsorption (hydrophobic interaction) and it is particularly suitable for lipase immobilization. Lifetech ECR1091M main features are high porosity, high mechanical stability and high surface area. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
06-0810 NEW	Enzyme carrier Lifetech™ ECR8204F White to off white spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-8°C). Do not freeze. Shelf life: 6 months; Particle Size: 150-300 micron; Pore Diameter: 300-600; Lifetech ECR1640 is a copolymer of divinylbenzene (DVB) and styrene functionalised with quaternary amines. It is used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the tertiary amines on the polymer. It is particularly suitable for immobilization of enzymes with iP in the range 3 - 5 like many glycosidases. Lifetech ECR1640 main features are possibility to regenerate the resin, pH adjustment before immobilization and large particle size for column applications. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
06-0813 NEW	Enzyme carrier Lifetech™ ECR8204M White to off white spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 6 months; Particle size: 300-710 micron; Pore Diameter: 300-600; Lifetech ECR8204M is a methacrylate polymer functionalised with epoxy groups, used for covalent enzyme immobilization. Epoxides form very stable covalent linkages with different protein surface groups as ε-NH ₂ in Lys or nucleophiles (amino, thiol, phenolic). Immobilization is performed under very mild experimental conditions of pH and temperature, at high ionic buffer strength. Lifetech ECR8204M main features are the low porosity, the hydrophilicity, high mechanical strength and it is optimal for use in batch reactors and columns.	50g 5x50g
06-0817 NEW	Enzyme carrier Lifetech™ ECR8209F white to off white spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 6 months; Particle Size: 150-300 micron; Pore Diameter: 300-600; Lifetech ECR8209F is a methacrylate polymer functionalised with epoxy groups, used for covalent enzyme immobilization. Epoxy groups form very stable covalent linkages with different protein surface groups as ε-NH ₂ in Lys or nucleophiles (amino, thiol, phenolic). Immobilization is performed under very mild experimental conditions of pH and temperature, at high ionic buffer strength. Lifetech ECR8209F main features are the high porosity, the hydrophilicity and it is optimal for use in batch reactors.	50g 5x50g
07-1512 NEW	Enzyme carrier Lifetech™ ECR8309F white to off white spherical beads (wet); SA: 70 min. m ² /g <i>(store cold)</i> Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 150-300 micron; Pore Diameter: 600-1200; Lifetech ECR8309F is a methacrylate polymer functionalised with amino groups on a short spacer (C2). It is used for covalent enzyme immobilization by pre-activation of the resin with glutaraldehyde and to subsequently form very stable covalent linkages with different protein groups (amino, thiol, phenolic) under very mild experimental conditions of pH and temperature, at low ionic buffer strength. It can also be used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the charged amines on the polymer. Lifetech ECR8309F main features are the medium porosity, the hydrophilicity and its optimal use in batch reactors. Sold in collaboration with Purolite for research purposes only.	50g 5x50g

BIOCATALYSTS (Compounds)

07-1515	Enzyme carrier Lifetech™ ECR8309M	50g
NEW	White to off white spherical beads (wet); SA: 70 min. m²/g (store cold) Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-710 micron; Pore Diameter: 600-1200; Lifetech ECR8309M is a methacrylate polymer functionalised with amino groups on a short spacer (C2). It is used for covalent enzyme immobilization by pre-activation of the resin with glutaraldehyde and to subsequently form very stable covalent linkages with different protein groups (amino, thiol, phenolic) under very mild experimental conditions of pH and temperature, at low ionic buffer strength. It can also be used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the charged amines on the polymer. Lifetech ECR8309M main features are the medium porosity, the hydrophilicity and its optimal use in batch reactors and columns. Sold in collaboration with Purolite for research purposes only.	5x50g
07-1518	Enzyme carrier Lifetech™ ECR8315F	50g
NEW	white to off white spherical beads (wet); SA: 60 min. m²/g (store cold) Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 150-300 micron; Pore Diameter: 1200-1800; Lifetech ECR8315F is a methacrylate polymer functionalised with amino groups on a short spacer (C2). It is used for covalent enzyme immobilization by pre-activation of the resin with glutaraldehyde and to subsequently form very stable covalent linkages with different protein groups (amino, thiol, phenolic) under very mild experimental conditions of pH and temperature, at low ionic buffer strength. Lifetech ECR8315F main features are the high porosity, the hydrophilicity and its optimal use in batch reactors. Sold in collaboration with Purolite for research purposes only.	5x50g
07-1520	Enzyme carrier Lifetech™ ECR8315M	50g
NEW	white to off white spherical beads (wet); SA: 60 min. m²/g (store cold) Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-710 micron; Pore Diameter: 1200-1800; Lifetech ECR8315M is a methacrylate polymer functionalised with amino groups on a short spacer (C2). It is used for covalent enzyme immobilization by pre-activation of the resin with glutaraldehyde and to subsequently form very stable covalent linkages with different protein groups (amino, thiol, phenolic) under very mild experimental conditions of pH and temperature, at low ionic buffer strength. It can also be used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the charged amines on the polymer. Lifetech ECR8315M main features are the medium porosity, the hydrophilicity and its optimal use in batch reactors and columns. Sold in collaboration with Purolite for research purposes only.	5x50g
07-1523	Enzyme carrier Lifetech™ ECR8409F	50g
NEW	white to off white spherical beads (wet); SA: 70 min. m²/g (store cold) Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 150-300 micron; Pore Diameter: 600-1200; Lifetech ECR8409F is a methacrylate polymer functionalised with amino groups on a long spacer (C6). It is used for covalent enzyme immobilization by pre-activation of the resin with glutaraldehyde and to subsequently form very stable covalent linkages with different protein groups (amino, thiol, phenolic) under very mild experimental conditions of pH and temperature, at low ionic buffer strength. It can also be used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the charged amines on the polymer. Lifetech ECR8409F main features are the medium porosity, the hydrophilicity and its optimal use in batch reactors. Sold in collaboration with Purolite for research purposes only.	5x50g

BIOCATALYSTS (Compounds)

07-1525	Enzyme carrier Lifetech™ ECR8409M	50g 5x50g
NEW	white to off white spherical beads (wet); SA: 70 min. m ² /g (store cold)	
	Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-710 micron; Pore Diameter: 600-1200; Lifetech ECR8409M is a methacrylate polymer functionalised with amino groups on a long spacer (C6). It is used for covalent enzyme immobilization by pre-activation of the resin with glutaraldehyde and to subsequently form very stable covalent linkages with different protein groups (amino, thiol, phenolic) under very mild experimental conditions of pH and temperature, at low ionic buffer strength. It can also be used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the charged amines on the polymer. Lifetech ECR8409M main features are the medium porosity, the hydrophilicity and its optimal use in batch reactors and columns. Sold in collaboration with Purolite for research purposes only.	
07-1528	Enzyme carrier Lifetech™ ECR8415F	50g 5x50g
NEW	white to off white spherical beads (wet); SA: 60 min. m ² /g (store cold)	
	Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 150-300 micron; Pore Diameter: 1200-1800; Lifetech ECR8415F is a methacrylate polymer functionalised with amino groups on a long spacer (C6). It is used for covalent enzyme immobilization by pre-activation of the resin with glutaraldehyde and to subsequently form very stable covalent linkages with different protein groups (amino, thiol, phenolic) under very mild experimental conditions of pH and temperature, at low ionic buffer strength. It can also be used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the charged amines on the polymer. Lifetech ECR8415F main features are the high porosity, the hydrophilicity and its optimal use in batch reactors. Sold in collaboration with Purolite for research purposes only.	
07-1530	Enzyme carrier Lifetech™ ECR8415M	50g 5x50g
NEW	White to off white spherical beads (wet); SA: 60 min. m ² /g (store cold)	
	Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-710 micron; Pore Diameter: 1200-1800; Lifetech ECR8415M is a methacrylate polymer functionalised with amino groups on a long spacer (C6). It is used for covalent enzyme immobilization by pre-activation of the resin with glutaraldehyde and to subsequently form very stable covalent linkages with different protein groups (amino, thiol, phenolic) under very mild experimental conditions of pH and temperature, at low ionic buffer strength. It can also be used for enzyme immobilization by ionic interaction of the ionizable surface aminoacids (Lys, Arg, His, Asp, Glu) with the charged amines on the polymer. Lifetech ECR8415M main features are the high porosity, the hydrophilicity and its optimal use in batch reactors. Sold in collaboration with Purolite for research purposes only.	
07-1532	Enzyme carrier Lifetech™ ECR8806F	50g 5x50g
NEW	White to off white spherical beads (wet); SA: 70 min. m ² /g (store cold)	
	Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 150-300 micron; Pore Diameter: 350-600; Lifetech ECR8806F is a methacrylic polymer functionalised with octadecyl groups. It is used for enzyme immobilization by adsorption (hydrophobic interaction) and it is particularly suitable for lipase and transaminases immobilization. Lifetech ECR8806F main features are very enzyme activity achieved upon immobilization compared to other existing resins. Sold in collaboration with Purolite for research purposes only.	

BIOCATALYSTS (Compounds)

07-1535	Enzyme carrier Lifetech™ ECR8806M	50g 5x50g
NEW	White to off white spherical beads (wet); SA: 70 min. m²/g Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-710 micron; Pore Diameter: 350-600; Lifetech ECR8806M is a methacrylic polymer functionalised with octadecyl groups. It is used for enzyme immobilization by adsorption (hydrophobic interaction) and it is particularly suitable for lipase and transaminases immobilization. Lifetech ECR8806M main features are very high enzyme activity achieved upon immobilization compared to other existing resins. Optimal for column packed reactors. Sold in collaboration with Purolite for research purposes only.	
06-0820	Enzyme carrier Lifetech™ ECR8209M	50g 5x50g
NEW	white to off white spherical beads (wet); SA: 70 min. m²/g (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 6 months; Particle Size: 300-710 micron; Pore Diameter: 600-1200; Lifetech ECR8209M is a methacrylate polymer functionalised with epoxy groups, used for covalent enzyme immobilization. Epoxy groups form very stable covalent linkages with different protein surface groups as ε-NH₂ in Lys or nucleophiles (amino, thiol, phenolic). Immobilization is performed under very mild experimental conditions of pH and temperature, at high ionic buffer strength. Lifetech ECR8209M main features are the high porosity, the hydrophilicity and it is optimal use in batch reactors and columns.	
06-0823	Enzyme carrier Lifetech™ ECR8215F	50g 5x50g
NEW	white to off white spherical beads (wet); SA: 60 min. m²/g (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 6 months; Particle Size: 150-300 micron; Pore Diameter: 1200-1800; Lifetech ECR8215F is a methacrylate polymer functionalised with epoxy groups, used for covalent enzyme immobilization. Epoxy groups form very stable covalent linkages with different protein surface groups as ε-NH₂ in Lys or nucleophiles (amino, thiol, phenolic). Immobilization is performed under very mild experimental conditions of pH and temperature, at high ionic buffer strength. Lifetech ECR8215F main features are the very high porosity, the hydrophilicity and it is optimal for use in batch reactors.	
06-0826	Enzyme carrier Lifetech™ ECR8215M	50g 5x50g
NEW	white to off white spherical beads (wet); SA: 60 min. m²/g (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 6 months; Particle Size: 300-710 micron; Pore Diameter: 1200-1800; Lifetech ECR8215M is a methacrylate polymer functionalised with epoxy groups, used for covalent enzyme immobilization. Epoxy groups form very stable covalent linkages with different protein surface groups as ε-NH₂ in Lys or nucleophiles (amino, thiol, phenolic). Immobilization is performed under very mild experimental conditions of pH and temperature, at high ionic buffer strength. Lifetech ECR8215M main features are the very high porosity, the hydrophilicity and its optimal use in batch reactors and columns.	
06-0828	Enzyme carrier Lifetech™ ECR8285	50g 5x50g
NEW	white to off white spherical beads (wet); SA: 100-200 m²/g (store cold) Note: Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 6 months; Particle Size: 500-1000 micron; Pore Diameter: 400-600; Lifetech ECR8285 is a methacrylate polymer functionalised with both butyl and epoxy groups. This combination creates a good balance of hydrophobicity that makes the polymer optimal for immobilization of hydrophobic enzymes like lipases and transaminases. Epoxides form very stable covalent linkages with different protein groups (amino, thiol, phenolic) under very mild experimental conditions of pH and temperature. Lifetech ECR8285 main features are the process advantages deriving from hydrophobic property combined with epoxy groups allowing the use in bi-phasic systems. Sold in collaboration with Purolite for research purposes only.	
96-0255	Enzyme carrier Lifetech™ ECRKIT1	
	See page 41	

BIOCATALYSTS (Compounds)

06-3115 NEW	Esperase® 8.0 L (9014-01-1)	10g
	amber liq. (semitransparent); d. 1.07 (store cold) Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 8KNPU-E/g. Serine endoprotease that hydrolyzes internal peptide bonds. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	50g 250g
96-4065	Lipase immo Kit - Immobilized enzymes See page 43	
06-3105 NEW	Lipozyme® CALB L (9001-62-1)	10g
	yellow to light-brown liq.; d. 1.2 (store cold) Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 5000 LU/g. Lipase that hydrolyzes ester bonds in glycerides. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	50g 250g
06-3140 NEW	Lipozyme® TL 100 L (9001-62-1)	10g
	yellow liq.; d. 1.05 (store cold) Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 100 KLU/g. Lipase that hydrolyzes ester bonds in glycerides. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	50g 250g
06-3155 NEW	Lipozyme® TL IM (9001-62-1)	10g
	off-white immobilized granulate; d. 0.4 (store cold) Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 250 IUN/g. Lipase that hydrolyzes ester bonds in glycerides. It is a 1,3 specific lipase which is immobilized on a non-compressible silica gel carrier into an immobilized granulate. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	50g 250g
06-3160 NEW	Neutrase® 0.8 L (9080-56-2)	10g
	brown liq.; d. 1.26 (store cold) Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 0.8 AU/g. Kinetic resolution of amino esters is a neutral, zinc metallo endoprotease, that randomly hydrolyzes internal peptide bonds and also facilitates enzymatic synthesis of oligopeptides by the reverse proteolysis reaction with zinc metal as co-catalyst. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	50g 250g

BIOCATALYSTS (Compounds)

06-3100	NovoCor® AD L (9001-62-1)	10g
	brown liq.; d. 1.17 (store cold)	50g 250g
NEW	Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 6000 LU/g. Lipase that hydrolyzes ester bonds in glycerides. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	
06-3123	Novozym® 435 (9001-62-1)	5g
	off-white immobilized granulate; d. 0.4 (store cold)	25g
NEW	Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 10000 PLU/g. Lipase that hydrolyzes ester bonds in glycerides. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	
06-3120	Novozym® 40086 (9001-62-1)	5g
	brown immobilized granulate; d. 0.33 (store cold)	25g
NEW	Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 275 IUN/g. Lipase that hydrolyzes ester bonds in glycerides. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	
06-3135	Novozym® 51032 (9001-62-1)	10g
	yellow to light-brown liq.; d. 1.04 (store cold)	50g 250g
NEW	Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 15 KLU/g. Lipase that hydrolyzes ester bonds in glycerides. Product may be hazy and contain slight precipitate. This does not affect enzyme activity or performance. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	
96-0224	Novozymes Endoprotease Screening Kit (contains 6 endoprotease enzymes)	
	See page 44	
96-0220	Novozymes Lipase Screening Kit (contains 9 lipase enzymes)	
	See page 45	
06-3118	Palatase® 20000 L (9001-62-1)	5g
	brown liq.; d. 1.19 (store cold)	25g 100g
NEW	Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 20000 LU-MM/g. Lipase that hydrolyzes ester bonds in glycerides. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	

BIOCATALYSTS (Compounds)

96-1580	Provivi Carbene/Nitrene Transferase Screening Kit See page 45	
06-3125	Resinase® HT (9001-62-1) yellow liq.; d. 1.05 (store cold) Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 50 KLU/g. Lipase that hydrolyzes ester bonds in glycerides. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	10g 50g 250g
NEW		
06-3137	Savinase® 12 T (9014-01-1) off-white granulate; d. 1.3 (store cold) Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 12 KNPU-S/g. Serine endoprotease that hydrolyzes internal peptide bonds. The granulate contains enzyme concentrate, inorganic salt, binder and coating materials. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	10g 50g 250g
NEW		
06-3150	Savinase® 16 L (9014-01-1) amber liq. (semitransparent); d. 1.16 (store cold) Note: Store at 0-10°C. DO NOT FREEZE. Declared activity 16 KNPU-S/g. A serine endoprotease that hydrolyzes internal peptide bonds. Color can vary from batch to batch. Color intensity is not an indication of enzyme activity. Packaging must be kept intact, dry and away from sunlight. Please follow the recommendations and use the product before the best before date to avoid the need for a higher dosage. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes	10g 50g 250g
NEW		

BORON (Compounds)

05-0120	Boron carbide, 0.1-1.5 microns (99.9+%-B) (12069-32-8) B ₄ C; FW: 55.26; gray to black powdr.; SA: 22-27 m ² /g; m.p. 2350°; b.p. >3500°; d. 2.52 Note: For sale in USA. For other countries contact Strem.	100g 500g
NEW		

Chemical Characteristics: B:C - 3.7-3.9 (ratio); C - min. 21.8%; N - max. 0.7%; O - max. 2.6%; Fe - max. 0.1%; Si - max. 0.15%; Al - max. 0.05%; M - max. 0.1%

Physical Characteristics: Packing Density - 1.3-1.5 g/cm³; Average Particle Size - 0.1-1.5 µm

05-0125	Boron nitride, hexagonal crystalline solid, min. 99% (10043-11-5) BN; FW: 24.82; off-white powdr.	50g 250g
NEW		
05-1320	Trimethylborate, 99.95+% (121-43-7) B(OCH ₃) ₃ ; FW: 103.92; colorless liq.; m.p. -29°; b.p. 68.7°; f.p. 30°F; d. 0.915 HAZ moisture sensitive	25g 100g
NEW		

CALCIUM (Compounds)

20-8450	Bis(pentamethylcyclopentadienyl)calcium tetrahydrofuran, 98% (101200-05-9) [(CH ₃) ₅ C ₅] ₂ Ca(C ₄ H ₈ O) ₂ ; FW: 454.74; pale yellow powdr. air sensitive	500mg 2g
NEW		
HAZ		

CARBON (Elemental Forms)

06-0310 NEW	Graphene film, monolayer, on Si/SiO₂ wafer (1cm x1cm), by CVD (1034343-98-0) C; FW: 12.011; wafer	1pc
06-0222 NEW	Graphene nanoplatelets, (2-10nm thick x ~5 microns wide) (1034343-98-0) C; black solid	5g 25g
06-0323 NEW	Graphene oxide (0.8-1.2nm thick x 1-15 microns wide, made by the Staudenmaier Method) black powdr.; SA: 5-10 m ² /g	250mg 1g
06-2545 NEW	Graphene oxide (4mg/ml water dispersion) (1034343-98-0) yellow-brown liq. dispersion	50ml 250ml

Physical Properties:

Form: Dispersion of graphene oxide sheets; *Sheet dimension:* Variable; *Color:* Yellow-brown; *Dispersibility:* Polar solvents; *Solvent:* Water; *pH:* 2.2-2.5; *Concentration:* 4 mg/mL; *Monolayer content (measured in 0.5 mg/mL):* >95%*

*Note: 4 mg/mL tends to agglomerate the GO flakes and dilution followed by slight sonication is required in order to obtain a higher percentage of monolayer flakes

Elemental Analysis: (sample preparation: 2g of 4 wt% GO in water were dried under vacuum at 60°C overnight)

Carbon: 49-56%; *Hydrogen:* 0-1%; *Nitrogen:* 0-1%; *Oxygen:* 41-50%; *Sulfur:* 0-2%

Quality Control:

Amount of residue on evaporation

pH control

Elemental analysis

Applications: Graphene/polymer composite materials, batteries, biomedical, solar cells, supercapacitors, support for metallic catalysts, low permeability materials, biosensors, multifunctional materials, graphene research

References:

1. *J. Mater. Chem.*, **2011**, 21, 9762.
2. *Environ. Sci. Technol.*, **2013**, 47, 3715.
3. *Phys. Chem. Chem. Phys.*, **2013**, 15, 2321.

06-2550 NEW	Graphene oxide, reduced (1034343-98-0) black powdr.	250mg 1g
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Physical Properties:

Form: powder; *Reduction method:* chemically reduced; *Sheet dimension:* variable; *Color:* black; *Solubility:* insoluble; *Dispersability:* <0.1 mg/mL in NMP, DMF, DMSO; *Humidity (Karl Fisher, TGA):* 3.7-4.2%; *Electrical conductivity:* 666,7 S/m (measured in a 20 nm film thickness); *BET surface area:* 422.69 - 499.85 m²/g; *Density:* 1.91 g/cm³

Elemental Analysis: (sample preparation: 2g of 4 wt% GO in water were dried under vacuum at 60°C overnight)

Carbon: 77-87%; *Hydrogen:* 0-1%; *Nitrogen:* 0-1%; *Oxygen:* 13-22%; *Sulfur:* 0%

Quality Control:

Elemental analysis

Applications: Batteries, biomedical, solar cells, supercapacitors, printable graphene electronics, graphene research

References:

1. *Nano Letters*, **2010**, 10, 92.
2. *J. Phys. Chem. Lett.*, **2013**, 4, 1347.

06-0318 NEW	Graphene powder (1-5 layers thick x 0.5-5 microns wide, surface area 650-750 m²/g) (1034343-98-0) C; FW: 12.011; black powdr.	250mg 1g
06-0313 NEW	Graphene powder (single layer, surface area 400-1000 m²/g) (1034343-98-0) C; FW: 12.011; black powdr.	50mg
06-0330	Graphene Quantum Dots (GQDs), Aqua-Green Luminescent (1034343-98-0) See page 54	
06-0332	Graphene Quantum Dots (GQDs) in water, Aqua-Green Luminescent (1034343-98-0) See page 55	
06-0334	Graphene Quantum Dots (GQDs), Blue Luminescent (1034343-98-0) See page 55	
06-0336	Graphene Quantum Dots (GQDs) in water, Blue Luminescent (1034343-98-0) See page 55	

CARBON (Elemental Forms)

06-0338 Graphene Quantum Dots (GQDs), Cyan Luminescent (1034343-98-0)

See page 55

06-0340 Graphene Quantum Dots (GQDs) in water, Cyan Luminescent (1034343-98-0)

See page 55

06-2510 Monolayer Graphene on Cu (10 mm x 10 mm) (1034343-98-0)

4pcs

C; FW: 12.011; wafer

NEW

Physical Properties:

Growth Method: Chemical Vapor Deposition (CVD synthesis); *Appearance:* Transparent; *Transparency:* >97%; *Coverage:* 98%; *Layers:* 1; *Thickness (theoretical):* 0.345 nm; *FET Electron Mobility on Al₂O₃:* 2000 cm²/Vs; *FET Electron Mobility on SiO₂:* 4000 cm²/Vs; *Sheet Resistance on SiO₂/Si:* 410-490 Ω/sq (1 cm x 1 cm); *Grain size:* Up to 10 μm

Substrate Cu foil:

Thickness: 18 μm

Pretreated for easier bottom layer removal: Monolayer graphene on the back side of Copper is partially removed, but not completely, so an additional treatment like RIE is needed before transfer to eliminate the bottom layer totally

Applications: Flexible batteries, electronics, aerospace, MEMS and NEMS, Microactuators, Conductive coatings

Quality Control: Raman Spectroscopy and Optical Microscopy

References:

1. *J. Electrochem. Soc.*, **2012**, 159, A752.
2. *J. Mater. Chem. A.*, **2013**, 1, 3177.

06-2518 Monolayer Graphene on Cu (60 mm x 40 mm) (1034343-98-0)

1pc

C; FW: 12.011; wafer

NEW

Physical Properties:

Growth Method: Chemical Vapor Deposition (CVD synthesis); *Appearance:* Transparent; *Transparency:* >97%; *Coverage:* 95%; *Layers:* 1; *Thickness (theoretical):* 0.345 nm; *FET Electron Mobility on Al₂O₃:* 2000 cm²/Vs; *FET Electron Mobility on SiO₂:* 4000 cm²/Vs; *Sheet Resistance on SiO₂/Si:* 410-490 Ω/sq (1 cm x 1 cm); *Grain size:* Up to 10 μm

Substrate Cu foil:

Thickness: 18 μm

Pretreated for easier bottom layer removal: Monolayer graphene on the back side of Copper is partially removed, but not completely, so an additional treatment like RIE is needed before transfer to eliminate the bottom layer totally

Applications: Flexible batteries, electronics, aerospace, MEMS and NEMS, Microactuators, Conductive coatings

Quality control: Raman Spectroscopy and Optical Microscopy

References:

1. *J. Electrochem. Soc.*, **2012**, 159, A752.
2. *J. Mater. Chem. A.*, **2013**, 1, 3177.

06-2523 Monolayer Graphene on Cu with PMMA coating (60mm x 40mm)
(1034343-98-0)

1pc

C; FW: 12.011; wafer

NEW

Physical Properties:

Growth Method: Chemical Vapor Deposition (CVD synthesis); *Appearance:* Transparent; *Transparency:* >97%; *Coverage:* 95%; *Layers:* 1; *Thickness (theoretical):* 0.345 nm; *FET Electron Mobility on Al₂O₃:* 2000 cm²/Vs; *FET Electron Mobility on SiO₂:* 4000 cm²/Vs; *Sheet Resistance on SiO₂/Si:* 410-490 Ω/sq (1 cm x 1 cm); *Grain size:* Up to 10 μm

Substrate Cu foil:

Thickness: 18 μm

Pretreated for easier bottom layer removal: Monolayer graphene on the back side of Copper is partially removed, but not completely, so an additional treatment like RIE is needed before transfer to eliminate the bottom layer totally

Applications: Flexible batteries, electronics, aerospace, MEMS and NEMS, Microactuators, Conductive coatings

Quality control: Raman Spectroscopy and Optical Microscopy

References:

1. *J. Electrochem. Soc.*, **2012**, 159, A752.
2. *J. Mater. Chem. A.*, **2013**, 1, 3177.

06-2534 Monolayer Graphene on SiO₂/Si (10mm x 10mm) (1034343-98-0)

4pc

C; wafer

NEW

Physical Properties:

Growth Method: Chemical Vapor Deposition (CVD synthesis); *Appearance:* Transparent; *Transparency:* >97%; *Coverage:* 95%; *Layers:* 1; *Thickness (theoretical):* 0.345 nm; *FET Electron Mobility on Al₂O₃:* 2000 cm²/Vs; *FET Electron Mobility on SiO₂:* 4000 cm²/Vs; *Sheet Resistance on SiO₂/Si:* 410-490 Ω/sq (1 cm x 1 cm); *Grain size:* Up to 10 μm

CARBON (Elemental Forms)

Substrate Cu foil:

Dry Oxide Thickness: 285-315 nm; Type/Dopant: P/Bor; Orientation: <100>; Resistivity: <0.005 Ohm-cm; Thickness: 505-545 μm ; Front surface: single side polished; Back surface: etched; Particles: <10@0.3 μm

Applications: Flexible batteries, electronics, aerospace, MEMS and NEMS, Microactuators, Conductive coatings

Quality control: Raman Spectroscopy and Optical Microscopy

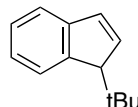
References:

1. *J. Electrochem. Soc.*, **2012**, 159, A752
2. *J. Mater. Chem. A.*, **2013**, 1, 3177

CARBON (Compounds)

06-0135 **1-t-Butyl-1H-indene, min. 95% (40650-31-5)**
 $\text{C}_{13}\text{H}_{16}$; FW: 172.27; colorless liq.

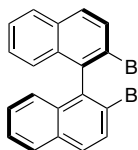
NEW



250mg
1g

06-0483 **(1R)-2,2'-Dibromo-1,1'-binaphthalene, min. 98% (86688-08-6)**
 $\text{C}_{20}\text{H}_{12}\text{Br}_2$; FW: 412.12; white to light-yellow solid
 Note: Sold in collaboration with Daicel for research purposes only.

NEW



50mg
100mg

06-0484 **(1S)-2,2'-Dibromo-1,1'-binaphthalene, min. 98% (150024-49-0)**
 $\text{C}_{20}\text{H}_{12}\text{Br}_2$; FW: 412.12; white to light-yellow powder.
 Note: Sold in collaboration with Daicel for research purposes only.

NEW

50mg
100mg

CHROMIUM (Compounds)

24-0000 **Chromium(III) acetate, 97% (1066-30-4)**
 $\text{Cr}(\text{CH}_3\text{CO}_2)_3$; FW: 229.13; green powder.

NEW

100g
500g

24-0190 **Chromium(III) bromide, anhydrous flakes, 99% (10031-25-1)**
 CrBr_3 ; FW: 291.71; dark-green flakes
hygroscopic

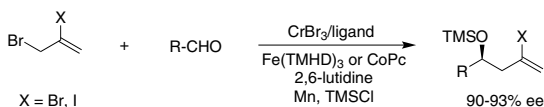
NEW

HAZ

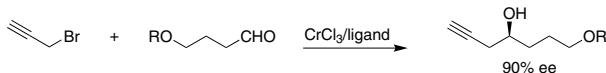
1g
5g

Technical Notes:

1. Catalytic Asymmetric 2-haloallylations of aldehydes
2. Catalytic Enantioselective propargylation of aldehydes



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

1. *J. Am. Chem. Soc.*, **2004**, 126, 12248
2. *Org. Lett.*, **2009**, 11, 4520

24-0183 **Chromium carbonyl, 98+% (13007-92-6)**
 $\text{Cr}(\text{CO})_6$; FW: 220.06; white to off-white solid

NEW

HAZ

5g
25g
100g

24-2427 **Chromium (III) naphthenate, 30-40% in heavy naphtha (2% Chromium) (61788-69-0)**
 green liq.

NEW

HAZ

100g
500g

COBALT (Compounds)

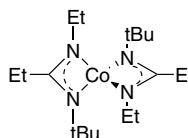
27-0468

NEW

Bis(N-t-butyl-N'-ethylpropanimidamido)cobalt(II), min. 98% (1011477-51-2)

$C_{18}H_{38}CoN_4$; FW: 369.45; blue-green liq.
air sensitive, moisture sensitive

Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard2



1g
5g

Technical Note:

1. Volatile cobalt complex for the atomic layer deposition of cobalt metal.

References:

1. *Chemistry of Materials*, **2014**, 26, 2642
2. *J. Phys. Chem. Lett.*, **2014**, 5, 1091
3. *Dalton T.*, **2008**, 19, 2592

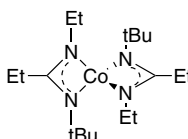
27-0469

NEW

Bis(N-t-butyl-N'-ethylpropanimidamido)cobalt(II), min. 98% (99.99%-Co) PURATREM (1011477-51-2)

$C_{18}H_{38}CoN_4$; FW: 369.45; blue-green liq.
air sensitive, moisture sensitive

Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard2



1g
5g

Technical Note:

1. Volatile Cobalt precursor for ALD/CVD

References:

1. *J. Phys. Chem. Lett.*, **2014**, 5, 1091
2. *Chem. Mater.*, **2014**, 26, 2642
3. *J. Mater. Chem. C.*, **2015**, 3, 2500

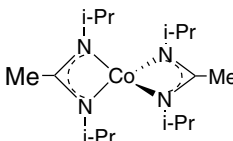
27-0486

NEW

Bis(N,N'-di-i-propylacetamidinato)cobalt(II), min. 98% (99.99%-Co) PURATREM (Co(iPr-MeAMD)₂ (635680-58-9)

$C_{16}H_{34}CoN_4$; FW: 341.40; green xtl.
air sensitive, moisture sensitive

Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard2.



250mg
1g
5g

amp

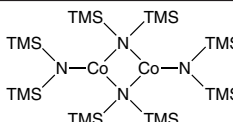
HAZ

27-0515

NEW

Bis{[μ-[di(trimethylsilyl)amide]}bis{[di(trimethylsilyl)amide]}dicobalt(II), 98% (93280-44-5)

$C_{24}H_{72}Co_2N_4Si_8$; FW: 759.41; brown solid
air sensitive, moisture sensitive



250mg
1g
5g

Technical Note:

1. Starting material for the synthesis of a variety of cobalt amines and alkoxides.

27-0405

NEW

Cobalt(II) chloride, anhydrous (99.999%-Co) PURATREM (7646-79-9)

$CoCl_2$; FW: 129.84; blue powdr.
hygroscopic

HAZ

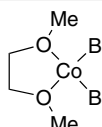
1g
5g
25g

27-0350

NEW

Cobalt(II) dibromo(1,2-dimethoxyethane), min. 98% (18346-57-1)

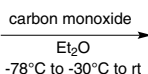
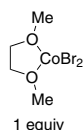
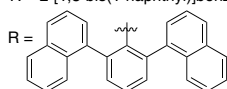
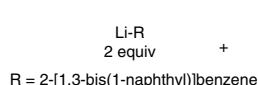
$CoBr_2 \cdot CH_3O(CH_2)_2OCH_3$; FW: 308.86; blue powdr.
moisture sensitive



1g
5g

Technical Note:

1. Cobalt(II) precursor to sterically encumbered ketones



Tech. Note (1)
Ref. (1)

COBALT (Compounds)

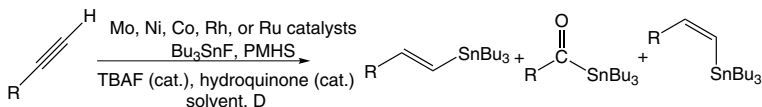
References:

1. *Chem. Commun.*, **2012**, 48, 8910

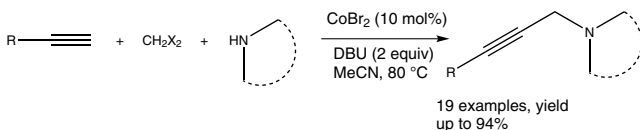
27-0477	Cobalt-dppe heterogeneous water oxidation catalyst (~17% Co) $\text{Co}_2(\text{dppe})_2(\text{CO})(\text{OH})_5(\text{H}_2\text{O})_9$; light-brown powdr. Note: Sold under license from Catalytic Innovations, LLC for research purposes only. US Patent Publication No. US20150065339 A1.	100mg 500mg
27-0575	Dichlorobis(triphenylphosphine)cobalt(II), 98% (14126-40-0) $\text{CoCl}_2[\text{P}(\text{C}_6\text{H}_5)_3]_2$; FW: 654.41; blue powdr. <i>air sensitive</i>	1g 5g 25g

Technical Notes:

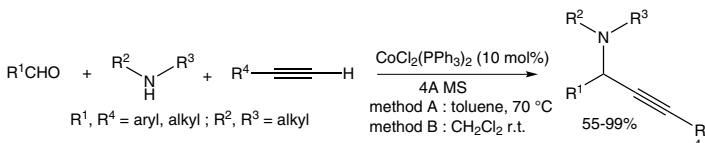
1. Catalyst used for hydrostannations.
2. Catalyst used for alkyne-dihalomethaneamine couplings. – an efficient route for propargylamines.
3. Cobalt-catalyzed transformation of alkynyl C-H bond: aldehyde-alkyne-amine coupling.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

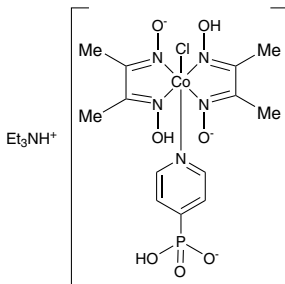


Tech. Note (3)
Ref. (3)

References:

1. *Tetrahedron*, **2013**, 69, 4000
2. *Tetrahedron Lett.*, **2012**, 53, 6199
3. *SynLett.*, **2010**, 3, 475

27-3015	Triethylammonium {chlorobis(dimethylglyoximate)(4-hydrogenphosphonatepyridinyl) cobaltate(III)} (1280199-86-1) $\text{C}_{19}\text{H}_{35}\text{ClCoN}_6\text{O}_7\text{P}$; FW: 584.88; light-brown solid	5mg 25mg
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Technical Notes:

1. Synthetic cobaloxime catalyst for reduction of aqueous protons to hydrogen in the presence of atmospheric oxygen.
2. Catalyst containing phosphonate anchor groups for immobilization on metal oxide semiconductor surfaces, enabling light-driven hydrogen evolution.

References:

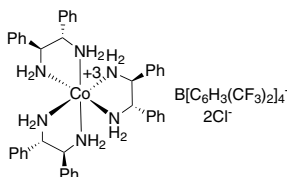
1. *Angew. Chem. Int. Ed.*, **2012**, 51, 9381
2. *Angew. Chem. Int. Ed.*, **2012**, 51, 12749
3. *Chem. Commun.*, **2011**, 47, 1695
4. *Chem. Sci.*, **2015**, 6, 2727

COBALT (Compounds)

27-4010

NEW

lambda-Tris[(1S,2S)-1,2-diphenyl-1,2-ethanediamine]cobalt(III) chloride tetrakis[3,5-bis(trifluoromethyl)phenyl]borate dihydrate SKJ-1 (1542135-29-4)
 $C_{74}H_{80}BCl_2CoF_{24}N_6$; FW: 1629.92(1665.92); orange powdr.
 Note: U.S. Patent 14/417655

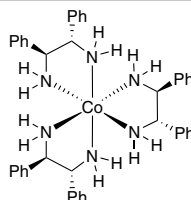


50mg
250mg

27-4011

NEW

delta-Tris[(1S,2S)-1,2-diphenyl-1,2-ethanediamine]cobalt(III) chloride tetrakis[3,5-bis(trifluoromethyl)phenyl]borate trihydrate SKJ-3 (1867120-15-7)
 $C_{74}H_{80}BCl_2CoF_{24}N_6$; FW: 1629.92(1647.94); orange solid
 Note: U.S. Patent 14/417655



50mg
250mg

COPPER (Compounds)

29-0225

NEW

Copper(I) bromide, dimethyl sulfide complex, 99% (54678-23-8)
 Br_2CuH_6S ; FW: 205.59; light-green powdr.
moisture sensitive

5g
25g

CYLINDERS (CVD/ALD)

95-0281

NEW

Stainless steel cylinder, 125ml, horizontal in line, with angled Bellows valve (150°C), DOT 4B, UN stamped
 Note: Compatible with Arradience and GEMStar systems. See the Technical Note tab at strem.com for drawings.

1cyl



95-4154

NEW

Stainless steel cylinder, 200ml, single vertical stem, electropolished with fill-port, PCTFE valve stem tip, DOT 4B, UN stamped
 Note: See the Technical Note tab at strem.com for drawings.

1cyl



ELECTROPOLISHED STAINLESS STEEL BUBBLERS (Vertical)

95-4155

NEW

Stainless steel bubbler, 150ml, vertical, electropolished with fill-port, high temp valves (315°C) with rotated handles, DOT 4B, UN stamped
 Note: See the Technical Note tab at strem.com for drawings.

1cyl



95-4157

NEW

Stainless steel bubbler, 200ml, vertical, electropolished with fill-port, high temp valves (315°C) with rotated handles, DOT 4B, UN stamped
 Note: See the Technical Note tab at strem.com for drawings.

1cyl

95-3000

NEW

Stainless steel bubbler, 150ml, vertical, electropolished with fill-port, replaceable-seat valves with rotated handles, DOT 4B, UN stamped
 Note: See the Technical Note tab at strem.com for drawings.

1cyl

ELECTROPOLISHED STAINLESS STEEL BUBBLERS (Horizontal)

98-0275

NEW

Stainless steel bubbler, 150ml, horizontal in line, electropolished with fill-port, PCTFE valve stem tip with rotated handles
Note: See the Technical Note tab at strem.com for drawings.



1cyl

GALLIUM (Compounds)

31-1370

NEW

Gallium (III) fluoride trihydrate (99.99%-Ga) PURATREM (7783-51-9)
 $\text{GaF}_3 \cdot 3\text{H}_2\text{O}$; FW: 126.72 (180.76); white xtl.
hygroscopic

1g

5g

GOLD (Elemental Forms)

79-7010

Gold Gemini Nanorods, CTAB Free (Wavelength 650 nm) (7440-57-5)
See page 52

79-7015

Gold Gemini Nanorods, CTAB Free (Wavelength 700 nm) (7440-57-5)
See page 53

79-7020

Gold Gemini Nanorods, CTAB Free (Wavelength 750 nm) (7440-57-5)
See page 53

79-7025

Gold Gemini Nanorods, CTAB Free (Wavelength 800 nm) (7440-57-5)
See page 53

79-7030

Gold Gemini Nanorods, CTAB Free (Wavelength 850 nm) (7440-57-5)
See page 53

96-1549

Gold Gemini Nanorods Kit, CTAB Free (Wavelength 650-850 nm)
See page 41

79-0921

NEW

Gold nanoparticles, 1% on carbon black (surfactant and reactant-free) (7440-57-5)
Au; FW: 196.70; black solid
(store cold)
Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.

5g

25g

79-0916

NEW

Gold nanoparticles, 1% on Titania (anatase) (surfactant and reactant-free) (7440-57-5)
Au; FW: 196.70; dark purple pwdr.
(store cold)
Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.

5g

25g

79-0905

NEW

Gold nanoparticles, 1% on Titania (rutile) (surfactant and reactant-free) (7440-57-5)
Au; FW: 196.70; purple solid
(store cold)
Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.

5g

25g

79-0926

NEW

Gold nanoparticles, 5% on carbon black (surfactant and reactant-free) (7440-57-5)
Au; FW: 196.70; black solid
(store cold)
Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.

5g

25g

79-0935

NEW

Gold nanoparticles, 10% on Titania (anatase) (surfactant and reactant-free) (7440-57-5)
Au; FW: 196.70; purple solid
(store cold)
Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.

1g

5g

GOLD (Elemental Forms)

79-0930

Gold nanoparticles, 10% on Titania (rutile) (surfactant and reactant-free)

1g

5g

NEW

(7440-57-5)

Au; FW: 196.70; dark purple solid

(store cold)

Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.

GOLD (Compounds)

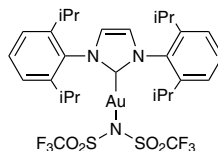
79-0245

[1,3-Bis(2,6-di-*i*-propylphenyl)imidazol-2-ylidene]

[bis(trifluoromethanesulfonyl)imide]gold(I), min.

95% (951776-24-2)

C₂₉H₃₆AuF₆O₄S₂; FW: 865.7; white to pale yellow solid
air sensitive

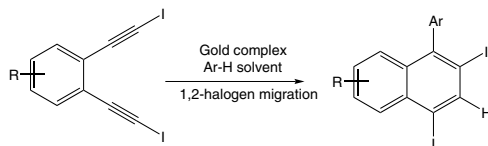


100mg

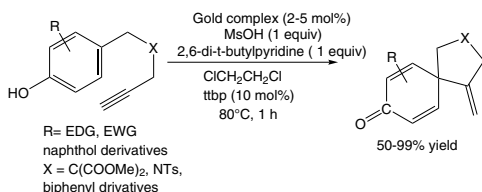
500mg

Technical Notes:

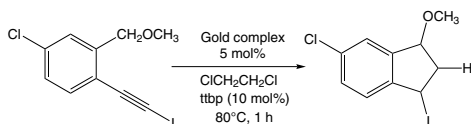
1. Gold catalyst used for the hydroarylation cyclization of 1,2-bis(2-iodoethynyl)benzenes.
2. Gold catalyst used for the carbocyclization of phenols with a terminal alkyne.
3. Intermolecular C-H activation through the gold(I)-catalyzed reaction of iodoalkynes.
4. Reaction of ynamide with benzyl azides.



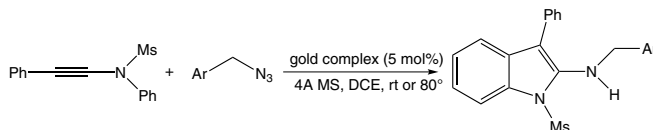
Tech. Note (1)
Ref. (1)



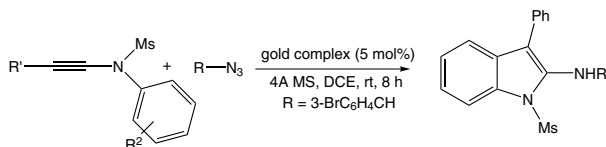
Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)



Tech. Note (4)
Ref. (4)

References:

1. *Adv. Synth. Catal.*, **2015**, 357, 500.
2. *Adv. Synth. Catal.*, **2014**, 356, 2417.

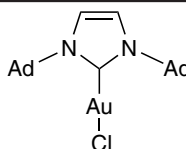
GOLD (Compounds)

- Angew. Chem. Int. Ed., **2015**, 54, 3052.
- J. Am. Chem. Soc., **2015**, 137, 9567.

79-1225

NEW

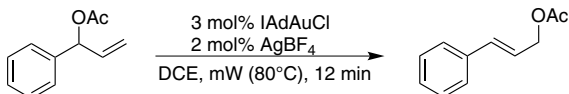
Chloro[1,3-bis(adamantyl)2H-imidazol-2-ylidene]gold(I), 98% (852445-88-6)
 $C_{23}H_{32}AuClN_2$; FW: 568.93; white to light-gray
 powdr.
air sensitive



100mg
500mg

Technical Note:

- Catalyst for the rearrangement of allylic acetates



Tech. Note (1)
Ref. (1)

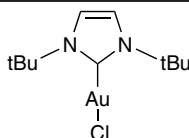
References:

- Org. Lett., **2007**, 9, 2653

79-1215

NEW

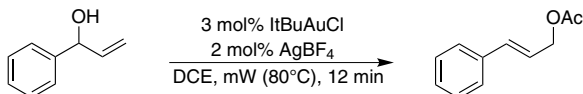
Chloro[1,3-bis(t-butyl)-2H-imidazol-2-ylidene]gold(I), 98% (839722-07-5)
 $C_{11}H_{20}AuClN_2$; FW: 412.71; white powdr.
air sensitive



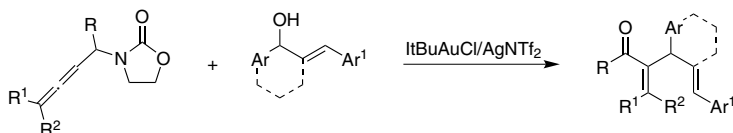
100mg
500mg

Technical Notes:

- Catalyst for the rearrangement of allylic acetates
- Catalyst for the α -allylation of enals and enones with alcohols



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

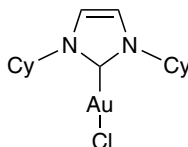
References:

- Org. Lett., **2007**, 9, 2653
- Angew. Chem. Int. Ed., **2015**, 54, 14885

79-1220

NEW

Chloro[1,3-bis(cyclohexyl)2H-imidazol-2-ylidene]gold(I), 98% (852445-87-5)
 $C_{15}H_{24}AuClN_2$; FW: 464.78; white to light-gray powdr.
air sensitive

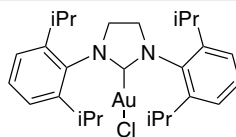


100mg
500mg

79-1210

NEW

Chloro[1,3-bis[2,6-di-i-propylphenyl]-4,5-dihydroimidazol-2-ylidene]gold(I), 98% SiPrAuCl (852445-84-2)
 $C_{27}H_{38}AuClN_2$; FW: 623.02; white powdr.
air sensitive

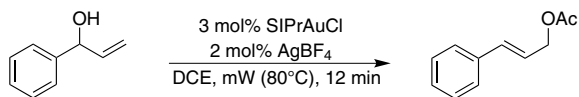


100mg
500mg

Technical Note:

- Catalyst for the rearrangement of allylic acetates

GOLD (Compounds)



Tech. Note (1)
Ref. (1)

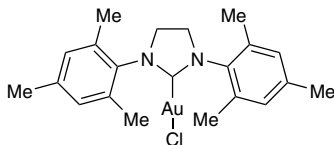
References:

1. *Org. Lett.*, **2007**, 9, 2653

79-1205

NEW

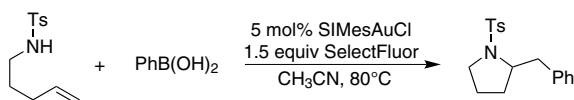
Chloro[1,3-bis(2,4,6-trimethylphenyl)-4,5-dihydroimidazol-2-ylidene]gold(I), 98%
(852445-82-0)
C₂₁H₂₆AuClN₂; FW: 538.86; white powdr.
air sensitive



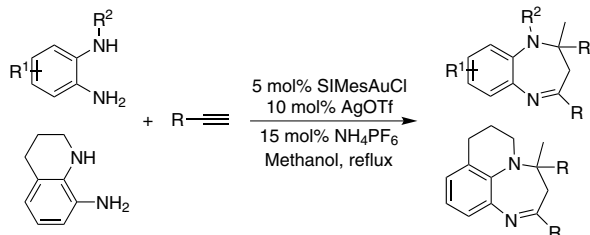
100mg
500mg

Technical Notes:

1. Catalyst for the carbobetterofunctionalization of alkenes with arylboronic acids
2. Catalyst for the synthesis of 1-substituted benzo[b][1,4]diazepines



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

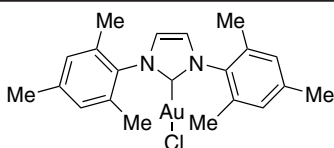
References:

1. *Tetrahedron*, **2013**, 69, 10375
2. *J. Organomet. Chem.*, **2014**, 751, 438

79-1200

NEW

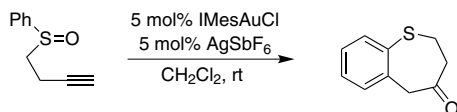
Chloro[1,3-bis(2,4,6-trimethylphenyl)-2H-imidazol-2-ylidene]gold(I), 98%
(852445-81-9)
C₂₁H₂₄AuClN₂; FW: 536.85;
white powdr.
air sensitive



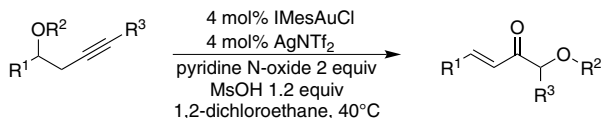
100mg
500mg

Technical Notes:

1. Catalyst for the rearrangement of alkynyl sulfoxides to benzothiepinones
2. Catalyst for the rearrangement of homopropargylic ethers to α,β-unsaturated carbonyl compound
3. Catalyst for oxidative cyclopropanation of N-Allylynamides to 3-aza-bicyclo[3.1.0]-hexan-2-one derivatives
4. Catalyst for oxidative rearrangement of homopropargylic ethers to cyclobutanones

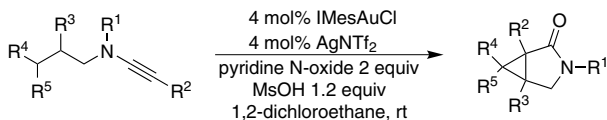


Tech. Note (1)
Ref. (1)

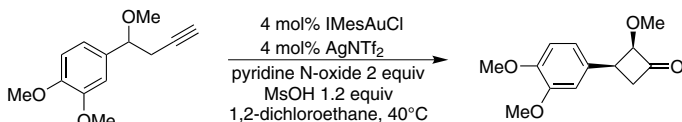


Tech. Note (2)
Ref. (2)

GOLD (Compounds)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)

References:

1. *J. Am. Chem. Soc.*, **2007**, 129, 4160
2. *Org. Lett.*, **2012**, 14, 4902
3. *Org. Lett.*, **2013**, 15, 2374
4. *Adv. Synth. Catal.*, **2013**, 355, 2488

79-0345 Chloro(dimethylsulfide)gold(I), min. 97% (29892-37-3)

250mg

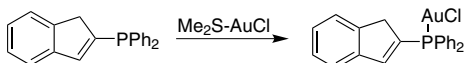
NEW

(CH₃)₂SAuCl; FW: 294.55; white to off-white solid
light sensitive, (store cold)

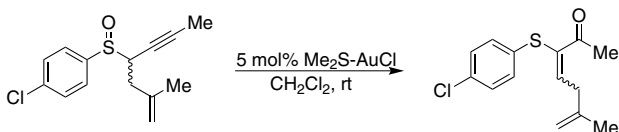
1g
5g

Technical Notes:

1. Gold(I) precursor to more advanced gold catalysts
2. Gold catalyst for the conversion of propargyl sulfoxides to α-thioenone



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

1. *Organometallics*, **2007**, 26, 1069
2. *J. Am. Chem. Soc.*, **2007**, 129, 4160

79-1122 Chloro(tetrahydrothiophene)gold(I), min. 98% (39929-21-0)

100mg

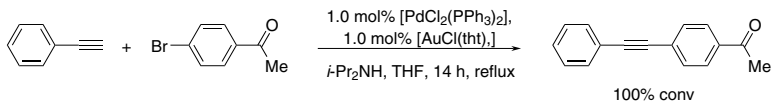
NEW

(C₄H₈S)AuCl; FW: 320.59; white to off-white powdr.
air sensitive, heat sensitive, light sensitive, (store cold)

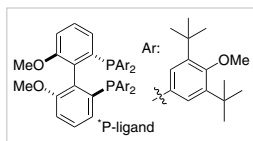
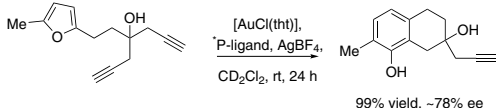
500mg

Technical Notes:

1. Employed as co-catalyst in Pd-catalyzed alkynylation.
2. Au-catalyzed phenol synthesis.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

1. *Catalysis Today*, **2007**, 122, 403.
2. *Chem. Eur. J.*, **2009**, 15, 13318.

HAFNIUM (Compounds)

72-7580

Tetrakis(2,2,6,6-tetramethyl-3,5-heptanedionato)hafnium(IV), 99%
(63370-90-1)

$C_{44}H_{76}HfO_8$; FW: 911.56; white xtl.

1g

5g

25g

NEW

IRIDIUM (Compounds)

77-0030

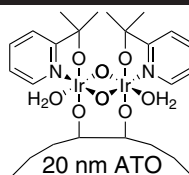
Antimony Tin Oxide/Iridium Het-WOC core/shell nanopowder, 20 nm (conductive and acid-stable)
blue powdr.

Note: Sold under license from Catalytic Innovations, LLC for research purposes only. US Patent Publication No. US20150021194 A1.

250mg

1g

NEW



ATO Composition: 90% SnO_2 , 10% Sb_2O_3 (w/w)

BET Surface Area: 50 – 60 m^2/g

Resistivity: 0.3 – 0.7 $\Omega \cdot cm$

77-0035

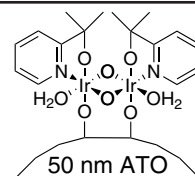
Antimony Tin Oxide/Iridium Het-WOC core/shell nanopowder, 50 nm (conductive and acid-stable)
blue powdr.

Note: Sold under license from Catalytic Innovations, LLC for research purposes only. US Patent Publication No. US20150021194 A1.

250mg

1g

NEW



ATO Composition: 90% SnO_2 , 10% Sb_2O_3 (w/w)

BET Surface Area: 40 – 50 m^2/g

Resistivity: 0.05 – 0.08 $\Omega \cdot cm$

77-0040

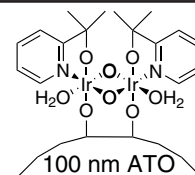
Antimony Tin Oxide/Iridium Het-WOC core/shell nanopowder, 100 nm (conductive and acid-stable)
blue powdr.

Note: Sold under license from Catalytic Innovations, LLC for research purposes only. US Patent Publication No. US20150021194 A1.

250mg

1g

NEW



ATO Composition: 90% SnO_2 , 10% Sb_2O_3 (w/w)

BET Surface Area: 5 – 10 m^2/g

Resistivity: 0.05 – 0.08 $\Omega \cdot cm$

77-0220

(2,2'-Bipyridine)bis[3,5-difluoro-2-[5-(trifluoromethyl)-2-pyridinyl-kN][phenyl-kC]iridium(III) hexafluorophosphate, 95% (1092775-62-6)

$C_{34}H_{18}F_{16}IrN_4P$; FW: 1009.70; yellow powdr.

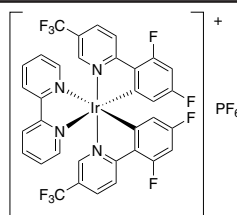
air sensitive

Note: Photocatalyst

50mg

250mg

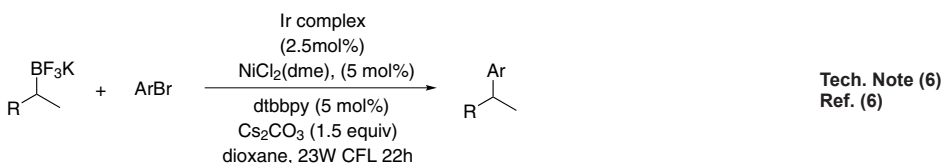
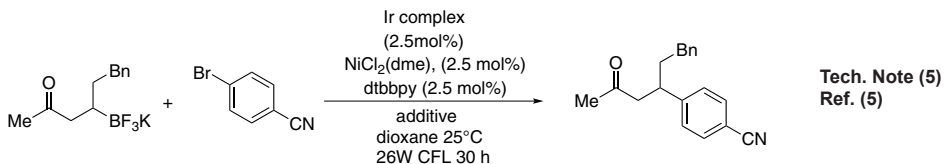
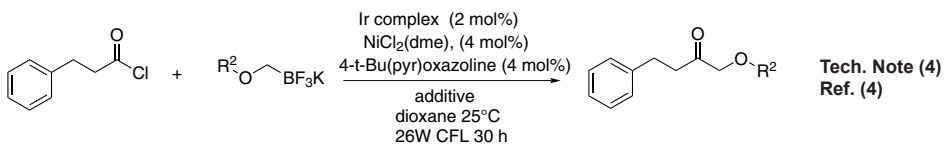
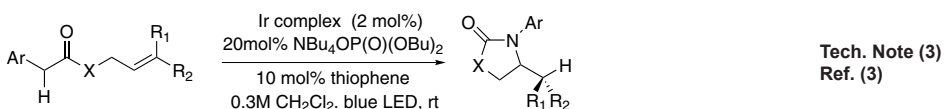
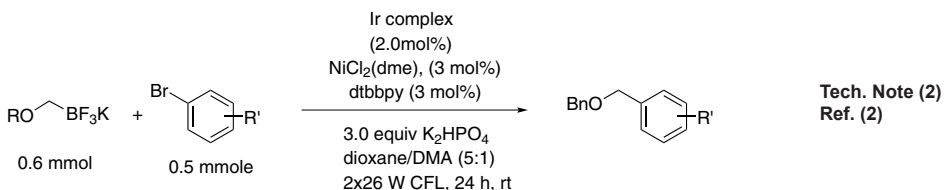
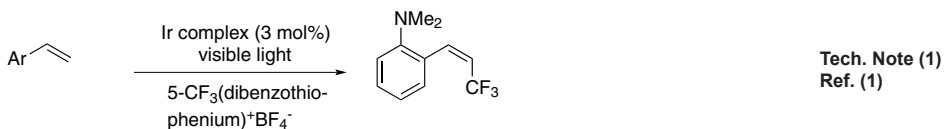
NEW



Technical Notes:

1. Catalyst used for the chemo-, regio, and stereoselective trifluoromethylation of styrene.
2. Photoredox catalyst used in cross-coupling: Ir/Ni dual catalysts for the synthesis of benzylic ethers.
3. Iridium complex used for catalytic olefin hydroamidation enabled by proton-coupled electron transfer.
4. Catalyst used for visible light photoredox cross-coupling of acyl chlorides with potassium alkoxymethyltrifluoroborates.
5. Iridium catalyst used in the photoredox/nickel dual catalytic cross-coupling of secondary alkyl β -trifluoroborotoketones and -esters with aryl bromides.
6. Photocatalyst used in the cross-coupling of trifluoroalkylboranes.

IRIDIUM (Compounds)



References:

1. *J. Org. Chem.*, **2014**, 79, 10446.
2. *Org. Lett.*, **2015**, 17, 3294.
3. *J. Am. Chem. Soc.*, **2015**, 137, 13495.
4. *Org. Lett.*, **2016**, 18, 732.
5. *Org. Lett.*, **2016**, 18, 2994.
6. *Org. Lett.*, **2016**, 18, 5760.

IRIDIUM (Compounds)

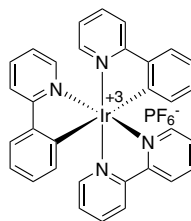
77-0465

NEW

(2,2'-Bipyridine)bis[2-pyridinyl-kN]phenyl-kC] iridium(III) hexafluorophosphate, 99% (106294-60-4)

$[\text{Ir}(\text{C}_{10}\text{H}_8\text{N}_2)(\text{C}_{11}\text{H}_8\text{N}_2)_2]\text{PF}_6^-$; FW: 801.74; yellow powdr.

Note: Photocatalyst



100mg

500mg

Technical Notes:

1. Catalyst used in the visible-light, photoredox-catalyzed synthesis of nitrones.
2. Catalyst used in light-mediated, direct arylation of arenes and heteroarenes.
3. Photoredox catalyst used in C-P bond formation reactions.

References:

1. *Org. Lett.*, **2014**, 16, 2872.
2. *Chem. Lett.*, **2013**, 42, 1203.
3. *Chem. Comm.*, **2011**, 47, 8679.

77-0218

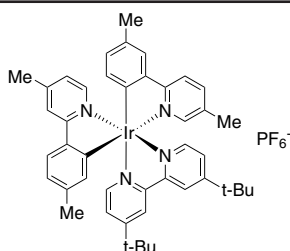
NEW

4,4'-Bis(t-butyl-2,2'-bipyridine)bis[5-methyl-2-(4-methyl-2-pyridinyl-kN)phenyl-kC]iridium hexafluorophosphate, 95% (1607469-49-7)

$\text{C}_{44}\text{H}_{48}\text{F}_6\text{IrN}_4\text{P}$; FW: 970.06; yellow powdr.

air sensitive

Note: Photocatalyst

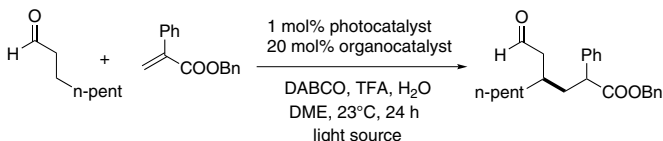


50mg

250mg

Technical Note:

1. Catalyst used for the direct β -alkylation of aldehydes via photoredox organocatalysis.



Tech. Note (1)
Ref. (1)

References:

1. *J. Am. Chem. Soc.*, **2014**, 136, 6858.

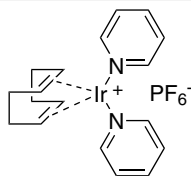
77-0440

NEW

Bis(pyridine)(1,5-cyclooctadiene)iridium(I) hexafluorophosphate, 99% (56678-60-5)

$(\text{C}_5\text{H}_5\text{N})_2(\text{C}_8\text{H}_{12})\text{Ir}_5\text{PF}_6^-$; FW: 603.56; orange powdr.

air sensitive



250mg

1g

Technical Notes:

1. This complex is used in the isomerization of primary allylic alcohols. (Ref. 1)
2. The catalyst is used for ortho-directed hydrogen-isotope exchange. (Ref. 2)

References:

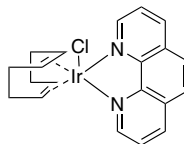
1. *Eur. J. Inorg. Chem.*, **2012**, 3320
2. *J. Labelled Compd. Rad.*, **2010**, 53, 695

IRIDIUM (Compounds)

77-0258

NEW

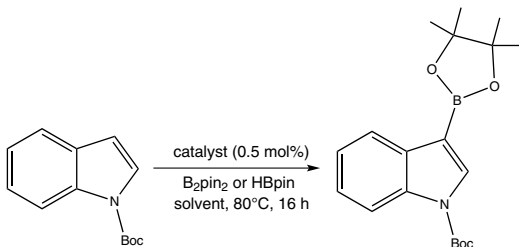
Chloro(1,5-cyclooctadiene)(1,10-phenanthroline) iridium(I) THF adduct, min. 98% (41396-69-4)
 $C_{20}H_{20}ClIrN_2$; FW: 516.05; purple solid
air sensitive



250mg
1g
5g

Technical Note:

1. Catalyst used in the C-H borylation of N-Boc-indoles.



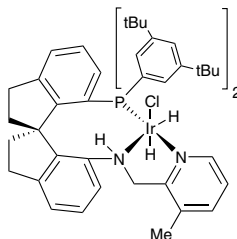
References:

1. *Organometallics*, **2014**, 33, 3514

77-4035

NEW

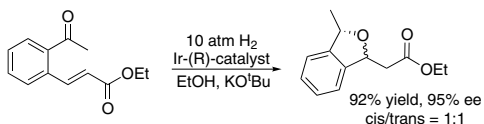
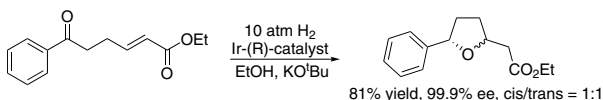
Chlorodihydrido(R)-(+)-7-Bis(3,5-di-*t*-butyl-phenyl)phosphino-7'-[(3-methylpyridine-2-yl-methyl)amino]-2,2',3,3'-tetrahydro-1,1'-spiro-biindane)iridium(III), >97% (>99% ee)
Ir-(R)-DTB-SpiroPAP-3-Me (1396201-63-0)
 $C_{52}H_{67}ClIrN_2P$; FW: 978.75; yellow-green solid



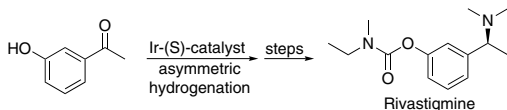
25mg
100mg

Technical Notes:

1. Catalyst for the enantioselective synthesis of chiral disubstituted oxa-cyclic ethers
2. Catalyst for the enantioselective hydrogenation for the asymmetric synthesis of Rivastigmine
3. Catalyst for the asymmetric hydrogenation for the synthesis of Crizotinib
4. Catalyst for the asymmetric hydrogenation of α -keto acids
5. Catalyst for the kinetic resolution of racemic aliphatic alcohols via selective asymmetric hydrogenation

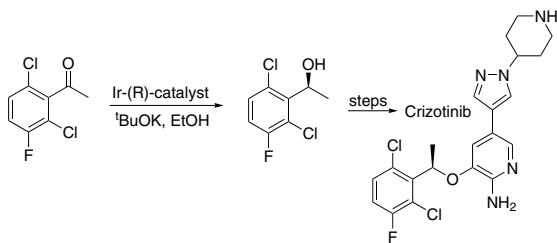


Tech. Note (1)
Ref. (1)

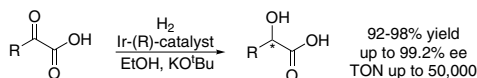


Tech. Note (2)
Ref. (2)

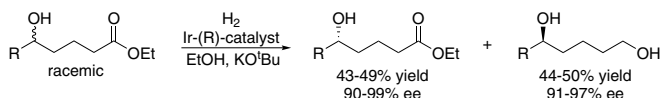
IRIDIUM (Compounds)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)



Tech. Note (5)
Ref. (5)

References:

1. *Org. Lett.*, **2012**, 14, 4758.
2. *Org. Process. Res. Dev.*, **2013**, 17, 307.
3. *Tetrahedron Lett.*, **2014**, 55, 1528.
4. *Chem. Commun.*, **2014**, 50, 15987.
5. *J. Am. Chem. Soc.*, **2014**, 136, 17426.

77-0436

NEW

Chlorodihydrido{(S)-(-)-7-Bis(3,5-di-*t*-butylphenyl)phosphino-7'-[3-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane}iridium(III), >97% (>99% ee) Ir-(S)-DTB-Spiro-PAP-3-Me (1418483-59-6)
C₅₂H₆₇ClIrN₂P; FW: 978.75; yellow-green solid

25mg
100mg

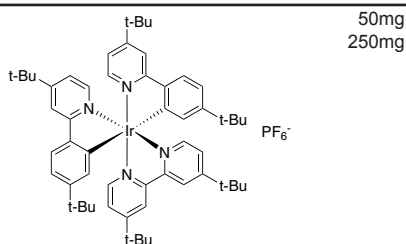
Technical Note:

1. See 77-0435 (page 26)

77-0285

NEW

[4,4'-Di-*t*-butyl-2,2'-bipyridine][bis[5-(*t*-butyl)-2-[4-(*t*-butyl)-2-pyridinyl-*k*N]phenyl-*k*C]iridium(III) hexafluorophosphate, 95% (808142-80-5)
C₉₆H₇₂F₆IrN₄P; FW: 1138.38; yellow powdr.
air sensitive
Note: Photocatalyst

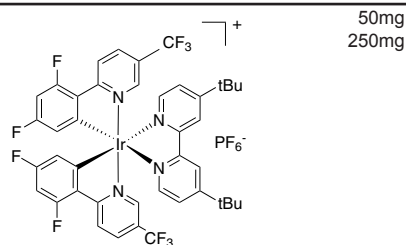


50mg
250mg

77-0425

NEW

(4,4'-Di-*t*-butyl-2,2'-bipyridine)bis[3,5-difluoro-2-[5-trifluoromethyl-2-pyridinyl-*k*N]phenyl-*k*C]iridium(III) hexafluorophosphate, 99% (870987-63-6)
[Ir(C₁₈H₂₄N₂)(C₁₂H₅F₅N₂)₂]⁺PF₆⁻; FW: 1121.91; yellow xtl.
Note: Photocatalyst

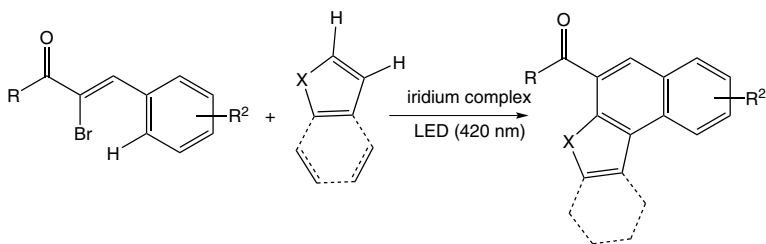


50mg
250mg

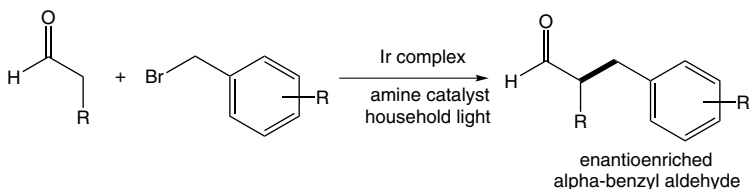
Technical Notes:

1. Visible light photoredox-catalyzed cascade cyclizations of α -bromochalcones or α -bromocinnamates with heteroarenes.
2. Enantioselective α -benzylation of aldehydes via photoredox organocatalysis.

IRIDIUM (Compounds)



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

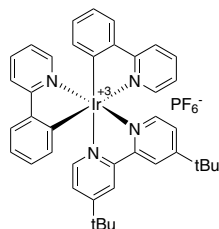
References:

1. *Adv. Synth. Cat.*, **2014**, 356, 557
2. *J. Amer. Chem. Soc.*, **2010**, 132, 13600

77-0410

NEW

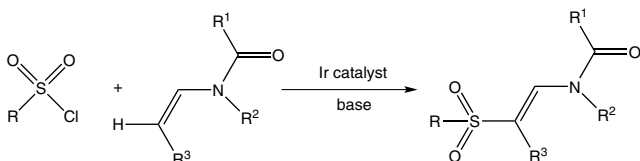
(4,4'-Di-*t*-butyl-2,2'-bipyridine)bis[2-(2-pyridinyl-*k*N)phenyl-*k*C]iridium(III) hexafluorophosphate, 99% (676525-77-2)
[Ir(C₁₈H₂₄N₂(C₁₁H₈N)₂)]⁺PF₆⁻; FW: 913.95; yellow xtl.
Note: Photocatalyst



100mg
500mg

Technical Notes:

1. This Iridium catalyst is used in the synthesis of β -amidovinyl sulfones via visible-light photoredox catalysis.
2. Numerous uses of this photoredox catalyst are reported (see Ref. 2).



Tech. Note (1)
Ref. (1)

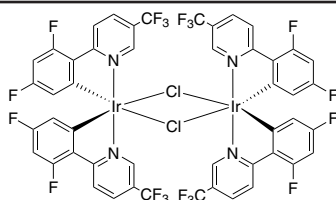
References:

1. *Adv. Synth. Cat.*, **2013**, 355, 809
2. *Chem. Rev.*, **2013**, 113, 5322, review

77-0468

NEW

Di- μ -chlorotetrakis[3,5-difluoro-2-[5-trifluoromethyl-2-pyridinyl-*k*N)phenyl-*k*C]diiridium(III), 99% (870987-64-7)
C₄₈H₂₀Cl₂F₂₀Ir₂N₄; FW: 1488.01; yellow xtl.
Note: Photocatalyst

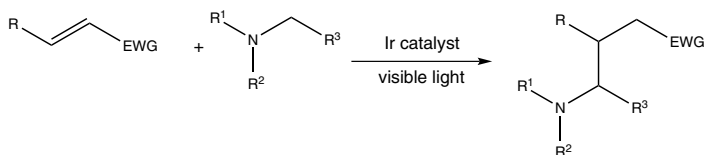


50mg
250mg

Technical Note:

1. Addition to electron-deficient alkenes using a photoredox catalyst.

IRIDIUM (Compounds)



Tech. Note (1)
Ref. (1)

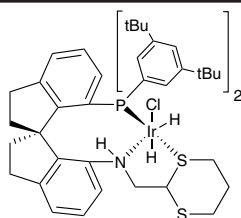
References:

1. *J. Am. Chem. Soc.*, **2012**, 134, 3338.

77-2510

NEW

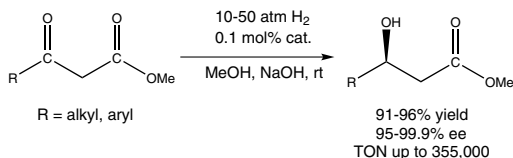
{(R)-(+)-7-[N-(1,3-Dithian-2-yl)methylamino]-7'-[bis(3,5-di-*t*-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane} chlorodihydroiridium(III), 97+% [Ir-(R)-DTB-SpiroSAP]
C₉₀H₆₈ClIrNPS₂; FW: 1005.86; pale yellow solid



25mg
100mg

Technical Note:

1. Catalyst used for the asymmetric hydrogenation of β -alkyl- β -ketoesters.



Tech. Note (1)
Ref. (1)

References:

1. *Angew. Chem. Int. Ed.*, **2015**, 54, 8791

77-2511

NEW

{(S)-(-)-7-[N-(1,3-Dithian-2-yl)methylamino]-7'-[bis(3,5-di-*t*-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane}chlorodihydroiridium(III), 97+% [Ir-(S)-DTB-SpiroSAP]
C₉₀H₆₈ClIrNPS₂; FW: 1005.86; pale yellow solid

25mg
100mg

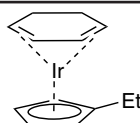
Technical Note:

1. See 77-2510 (page 29)

77-1105

NEW

1-Ethylcyclopentadienyl-1,3-cyclohexadieneiridium(I), 99% (99.9%-Ir) (721427-58-3)
C₁₃H₁₇Ir; FW: 365.49; pale yellow liq.



250mg
1g

77-3010

NEW

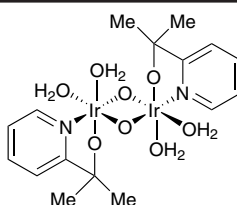
Iridium(III) chloride, hydrate (99.99%-Ir) PURATREM [free of Ir(IV) by electrochemical analysis] (14996-61-3)
IrCl₃·xH₂O; FW: 298.58; black xtl.
hygroscopic

250mg
1g
5g

77-0025

NEW

[2-(Pyridine-2-yl)-2-propanato]iridium(IV) dimer solution 97% (1 mM in 0.1 Molar aqueous NaIO₃) (1446713-81-0)
C₁₆H₂₈IrNO₃; FW: 728.84; blue liq.
Note: Sold under license from Catalytic Innovations, LLC for research purposes only. US Patent Publication No. US20150021194 A1.



10ml
50ml

Standard Operating Procedure

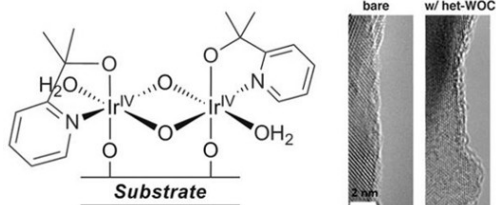
Heterogenization of the material is straightforward and can be performed in air, at ambient temperature, with no additives, applied potential or other treatment required. For most carbon-based or metal oxide substrates:

IRIDIUM (Compounds)

1. Dip substrate in het-WOC deposition solution (or disperse powders, if powder).
2. Wait 4-12 hours (typically overnight).
3. Remove substrate from solution (or filter out powder) and rinse with clean water.

This will cause the monolayer Ir material to be deposited on the substrate, with a surface structure as shown¹ (TEM image on iron oxide shown to the right):

The het-WOC deposition solution may be diluted, in order to increase its coverage over large substrates. As stated in the SDS, the het-WOC deposition solution it is mostly comprised of water, therefore dilution with water is best. It can also be re-used repeatedly to load multiple substrates with the Ir monolayer – each loading only uses a small amount of the Ir present in solution, depending on surface area of substrate.



References:

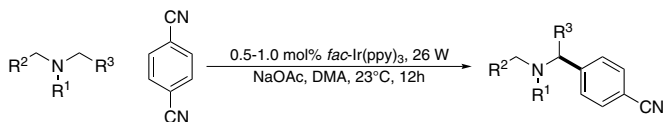
1. *J. Am. Chem. Soc.*, **2013**, 135, 10837.
2. *J. Am. Chem. Soc.*, **2014**, 136, 13826.
3. *Nat. Commun.*, **2015**, 6, 6469.
4. *Angew. Chem. Int. Ed.*, **2015**, 54, 11428.
5. *Energy Environ. Sci.*, **2016**, 9, 1794.

77-7030	Tris[2-(2,4-difluorophenyl)pyridine]iridium(III), 95% (387859-70-3) $C_{33}H_{18}F_6IrN_3$; FW: 762.72; yellow powdr. <i>air sensitive</i> Note: Photocatalyst		50mg 250mg
77-6100	Tris[5-fluoro-2-(2-pyridinyl-kN)phenyl-kC]iridium(III), 95% (370878-69-6) $C_{33}H_{21}F_3IrN_3$; FW: 708.75; yellow powdr. <i>air sensitive</i> Note: Photocatalyst		50mg 250mg
77-7015	Tris(2-phenylpyridinato-C2,N)iridium(III), 95% (94928-86-8) $C_{33}H_{24}IrN_3$; yellow powdr. <i>air sensitive</i> Note: Photocatalyst		50mg 250mg

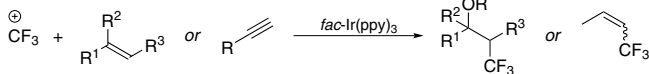
Technical Notes:

1. Photocatalyst for α -amino C–H arylation of cyano(hetero)arenes by tertiary amines
2. Photocatalyst for trifluoromethylation of alkenes and alkynes
3. Photocatalyst for reduction of alkyl, alkenyl, aryl iodides (a) and intramolecular reductive cyclizations (d)
4. Photocatalyst for organocatalyst assisted direct arylation of allylic sp^3 C–H bonds
5. Photocatalyst for the generation multifluorinated biaryls via functionalization of the C–F bond of a perfluoro-arene and C–H bond of the other arene in the presence of amines
6. Photocatalyst for visible-light photoredox arylation of thiols with various aryl halides

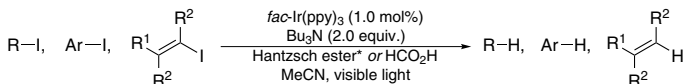
IRIDIUM (Compounds)



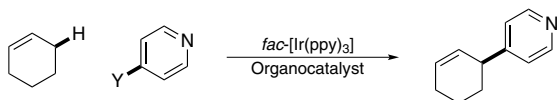
Tech. Note (1)
Ref. (1)



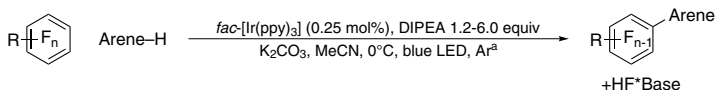
Tech. Note (2)
Ref. (2,3)



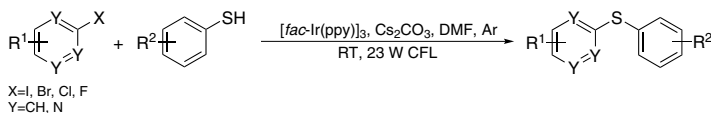
Tech. Note (3)
Ref. (4)



Tech. Note (4)
Ref. (5)



Tech. Note (5)
Ref. (6)



Tech. Note (6)
Ref. (7)

References:

1. *Science* **2011**, 334, 1114
2. *Angew. Chem. Int. Ed.* **2012**, 51, 9567
3. *Angew. Chem. Int. Ed.* **2014**, 53, 539
4. *Nat. Chem.* **2012**, 4, 854
5. *Nature* **2015** 519, 74
6. *J. Am. Chem. Soc.* **2016**, 138, 2520
7. *Angew. Chem. Int. Ed.* **2017**, 56, 874

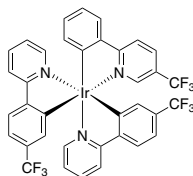
77-6580

NEW

Tris[(2-(2-pyridinyl-kN)-5-(trifluoromethyl)phenyl-kC)iridium(III)], 95% (500295-52-3)

C₃₆H₂₁F₉IrN₃; FW: 858.78; yellow solid
air sensitive

Note: Photocatalyst



50mg
250mg

IRON (Compounds)

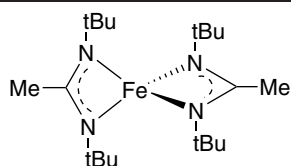
98-4038

NEW

Bis(N,N'-di-t-butylacetamidinato)iron(II), min. 98%, 26-0145, contained in 50 ml Swagelok® (96-1070) cylinder for CVD/ALD (635680-56-7)

C₃₀H₄₂N₄Fe; FW: 394.42; off-white to gray xtl.; m.p. 107°
air sensitive, moisture sensitive

Note: Extremely air-sensitive. Contact Strem to discuss. Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard2



5g

IRON (Compounds)

26-0873

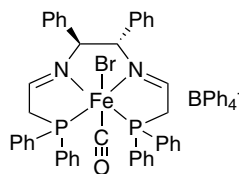
NEW

Bromocarbonyl[(1S,2S)-2,3-diphenylethylenediamine-N,N'-bis(2-diphenylphosphinoethylidene)] iron(II) tetraphenylborate, FeATHer-II Catalyst (1257252-03-1)

$C_{87}H_{65}BBrFeN_2OP_2$; FW: 1122.75; yellow pwdr.

air sensitive, moisture sensitive

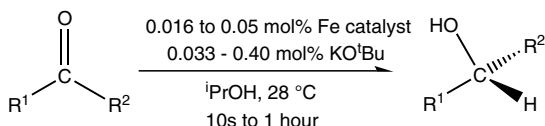
Note: Sold in collaboration with GreenCentre for research purposes only. Patents: PCT/CA2013/050405, PCT 2013/010275.



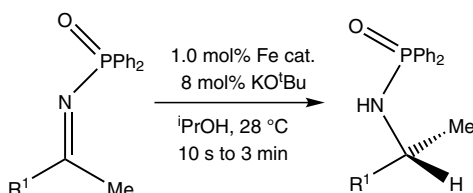
100mg
500mg

Technical Note:

1. Catalyst used in the transfer hydrogenation of ketones and imines.



Tech. Note (1)
Ref. (1)



Tech. Note (1)
Ref. (1)

References:

1. *Science*, **2013**, 342, 1080.

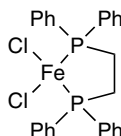
26-0923

NEW

Dichloro[1,2-bis(diphenylphosphino)ethane] iron(II), 98% (41536-18-9)

$C_{26}H_{24}Cl_2FeP_2$; FW: 525.17; white-gray xtls.

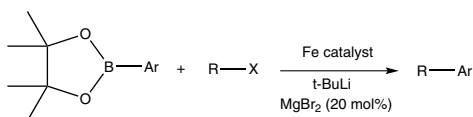
air sensitive



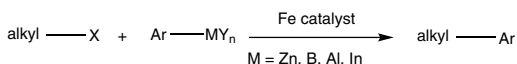
1g
5g

Technical Notes:

1. Catalyst used for the coupling of alkyl, benzyl and allyl halides with arylboronic esters.
2. Catalyst used for general cross-coupling reactions.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

1. *Chem. Eur. J.*, **2014**, 20, 7935
2. *Angew. Chem. Int. Ed.*, **2013**, 52, 1285

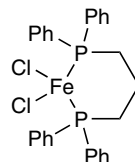
26-0945

NEW

Dichloro[1,3-bis(diphenylphosphino)propane]iron(II), 98% (106245-43-6)

$C_{27}H_{28}Cl_2FeP_2$; FW: 539.19; white pwdr.

air sensitive

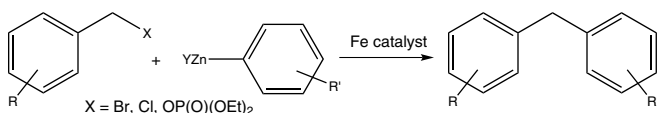


1g
5g

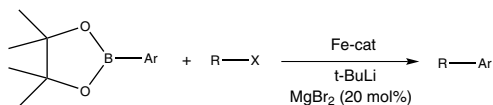
Technical Notes:

1. Iron precatalyst used in the cross-coupling of benzylhalides and phosphates.
2. Expedient iron-catalyzed coupling of alkyl, benzyl and allyl halides with arylboronic esters.

IRON (Compounds)



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

R = alkyl, benzyl, allyl

References:

1. *Chem. Commun.*, **2009**, 5, 600
2. *Chem-Eur. J.*, **2014**, 20, 7935

26-1240

NEW

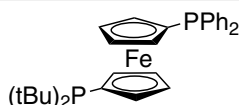
1-Diphenylphosphino-1'-(di-t-butylphosphino)

ferrocene, 97% (95408-38-1)

$\text{C}_{30}\text{H}_{38}\text{FeP}_2$, FW: 514.40; yellow to orange powdr;

m.p. 75-79°

air sensitive



250mg

1g

26-3725

NEW

Iron azobenzene tetracarboxylic, Porous [PCN-250(Fe)],

CONEKIT™ F250 (1771755-22-6)

Dark red-brown powdr.

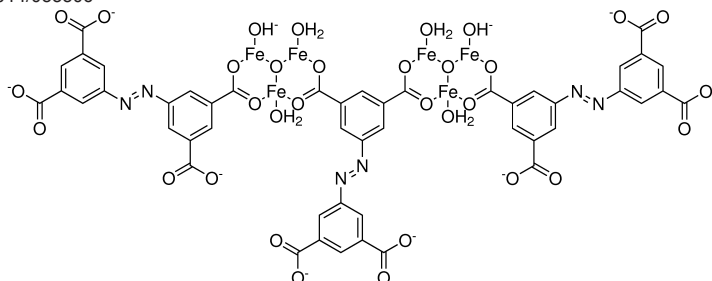
Note: Sold in collaboration with framergy for research purposes only.

PCT/GB2014/053506

500mg

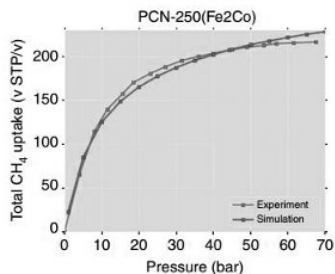
2g

10g



Technical Note:

1. Metal-Organic Framework (MOF) exhibiting superior uptake of hydrogen and methane. Stable in water and aqueous solutions.



Tech. Note (1)
Ref. (1)

References:

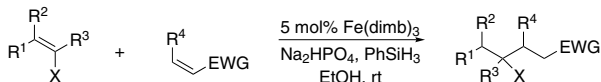
1. *Nat. Commun.*, **2014**, 5, 5723
2. *Sci. Technol. Adv. Mater.*, **2015**, 16, 054202

IRON (Compounds)

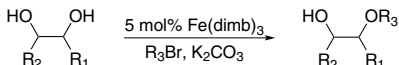
26-2340 NEW	Iron(III) 1,3,5-benzenetricarboxylate hydrate, porous (F-free MIL-100(Fe), KRICT F100) [Iron trimesate] (1257379-83-1) $[\text{Fe}_3\text{O}(\text{H}_2\text{O})_2(\text{OH})(\text{C}_6\text{H}_3(\text{COO})_3)_2] \cdot \text{XH}_2\text{O}$; red solid Note: Sold under agreement with KRICT for research and development purposes only. Patents US 8507399 B2, US 8252950 B2.	KRICT F100	500mg 2g	
26-0065 NEW	Iron(II) bromide, dimethoxyethane, min. 98% (99611-53-7) $\text{FeBr}_2 \cdot \text{CH}_3\text{O}(\text{CH}_2)_2\text{OCH}_3$; FW: 305.77; light brown xtl. <i>moisture sensitive</i>		1g 5g 25g	
26-0078 NEW	Iron(II) bromide, Bis(tetrahydrofuran), min. 98% (70317-91-8) $\text{FeBr}_2 \cdot (\text{C}_4\text{H}_8\text{O})_2$; FW: 359.86; light brown xtl. <i>air sensitive, moisture sensitive</i>		1g 5g 25g	
26-3765 NEW	Tetramethylammonium ferricyanide, 98% (14591-44-7) $\text{C}_{18}\text{H}_{36}\text{FeN}_6$; FW: 434.38; yellow xtl.		100mg 500mg	
26-3915 NEW	Tris(2,6-dimethyl-3,5-heptanedionato) iron(III), 98% Fe(dimb)3 (24444-72-2) $\text{C}_{27}\text{H}_{45}\text{FeO}_6$; FW: 521.49; red-orange xtl.		500mg 2g 10g	

Technical Notes:

1. Iron catalyst for olefin cross-coupling
2. Iron catalyst for regioselective alkylation of diols and polyols



Tech. Note (1)
Ref. (1)

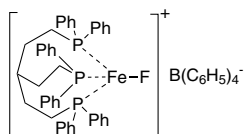


Tech. Note (2)
Ref. (2)

References:

1. *Nature*, **2014**, 516, 343.
2. *Chem. Eur. J.*, **2016**, 22, 2481.

26-3955
NEW
Tris[[2-(diphenylphosphino)ethyl]phosphine] (fluoro)iron(II) tetraphenylborate, min. 98%
(1318882-54-0)
 $\text{C}_{86}\text{H}_{62}\text{FeBFP}_4$; FW: 1064.75; purple solid



100mg
500mg

KITS

96-3810

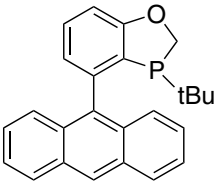
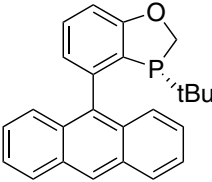
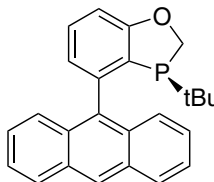
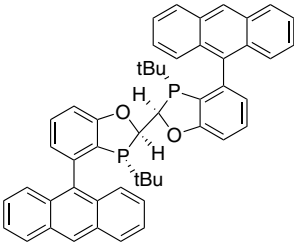
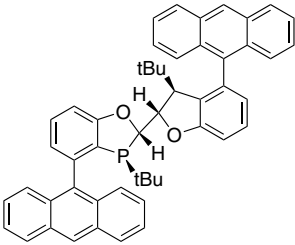
AntPhos and WingPhos Kit

Sold in collaboration with Zejun for research purposes only. Patents

ZL201310020371.1, CN 201610056390.

Components also available for individual sale.

Contains the following:

 15-1960 25mg	 15-1963 25mg	 15-1967 25mg
 15-1970 25mg	 15-1975 25mg	

15-1960	4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 98+% rac-AntPhos (1268693-24-8)	25mg	See page 90
15-1963	(R)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 98+% (>99% ee) [(R)-AntPhos] (1456816-37-7)	25mg	See page 91
15-1967	(S)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 99+% (>99% ee) [(S)-AntPhos] (1807740-34-6)	25mg	See page 91
15-1970	(2R,2'R,3R,3'R)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98% (>90% ee), [(2R,2'R,3R,3'R)-WingPhos] (1884680-45-8)	25mg	See page 100
15-1975	(2S,2'S,3S,3'S)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98%, (>99% ee), [(2S,2'S,3S,3'S)-WingPhos] (1435940-19-4)	25mg	See page 101

KITS

96-0400

NEW

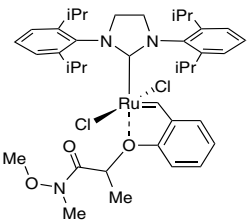
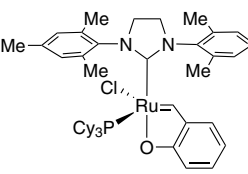
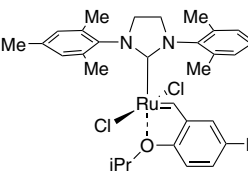
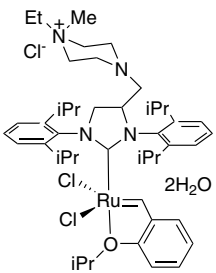
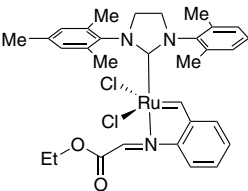
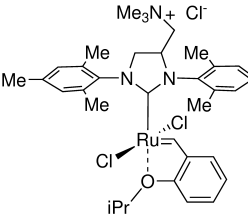
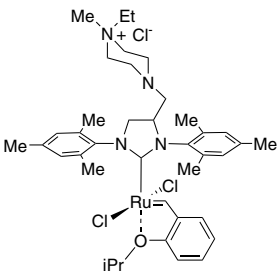
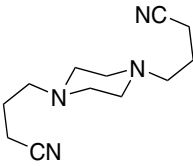
Apeiron Ruthenium Metathesis Catalyst Kit

Sold in collaboration with Apeiron Synthesis, Inc.

Metal Scavenger (07-2203) also included.

Components also available for individual sale.

Contains the following:

 44-0750 100mg	 44-0753 100mg	 44-0758 100mg
 44-0759 100mg	 44-0760 100mg	 44-0765 100mg
 44-0768 100mg	 07-2203 1g	

44-0750	[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene] {2-[[1-(methoxy(methyl)amino)-1-oxopropan-2-yl]oxy]benzylidene}ruthenium(II) dichloride GreenCat (1448663-06-6)	100mg	See page 120
44-0753	[1,3-Bis(2,4,6-trimethylphenyl)imidazolidin-2-ylidene] (tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet (1407229-58-6)	100mg	See page 122
44-0758	[1,3-Bis(2,4,6-trimethylphenyl)imidazolidin-2-ylidene]]-(2-i-propoxy-5-nitrobenzylidene)ruthenium(II) dichloride nitro-Grela (502964-52-5)	100mg	See page 121

KITS

44-0759	(1,3-Bis(2,6-diisopropylphenyl)-4-((4-ethyl-4-methylpiperazin-1-ium-1-yl)methyl)imidazolidin-2-ylidene)(2-isopropoxybenzylidene)ruthenium(II) chloride dihydrate FixCat (1799947-97-9)	100mg	See page 119
44-0760	Dichloro(1,3-dimesitylimidazolidin-2-ylidene){2-[(ethoxy-2-oxoethylidene)amino]benzylidene} ruthenium(II) HeatMet	100mg	See page 123
44-0765	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio)methyl]imidazolidin-2-ylidene)-(2-i-propoxybenzylidene) dichlororuthenium(II) chloride StickyCat Cl (1452227-72-3)	100mg	See page 122
44-0768	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(4-ethyl-4-methylpiperazin-1-ium-1-yl)methyl]imidazolidin-2-ylidene)-(2-i-propoxybenzylidene)dichlororuthenium(II) chloride AquaMet (1414707-08-6)	100mg	See page 121
07-2203	1,4-Bis(2-isocyanopropyl)piperazine (SnatchCat Metal Scavenger) (51641-96-4)	1g	See page 48

96-5512

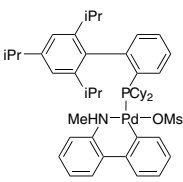
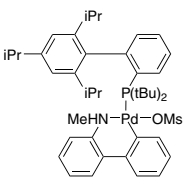
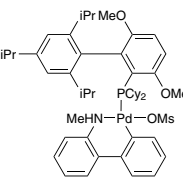
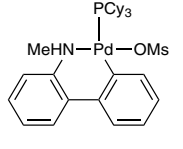
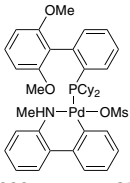
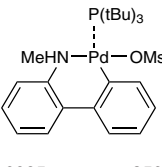
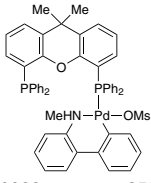
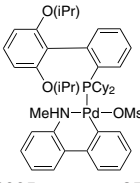
NEW

Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methylamino-1,1'-biphenyl-2-yl- Palladacycles Gen. 4)

Patents: PCT/US2013/030779, US Serial No. 13/799620

Components also available for individual sale.

Contains the following:

 46-0327 250mg	 46-0330 250mg	 46-0333 250mg	 46-0379 250mg
 46-0380 250mg	 46-0385 250mg	 46-0388 250mg	 46-0395 250mg

46-0327	Methanesulfonato(2-dicyclohexylphosphino-2',4',6'-tri-i-propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl) palladium(II), min. 98% [XPhos Palladacycle Gen. 4] (1599466-81-5)	250mg	See page 87
46-0330	Methanesulfonato(2-di-t-butylphosphino-2',4',6'-tri-i-propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl) palladium(II) dichloromethane adduct, min. 98% [t-BuXphos Palladacycle Gen. 4] (1599466-89-3)	250mg	See page 85
46-0333	Methanesulfonato(2-dicyclohexylphosphino-3,6-dimethoxy-2',4',6'-tri-i-propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [BrettPhos Palladacycle Gen. 4] (1599466-83-7)	250mg	See page 86
46-0379	Methanesulfonato(tricyclohexylphosphino)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [PCy ₃ Palladacycle Gen. 4]	250mg	See page 90

KITS

46-0380	Methanesulfonato(2-dicyclohexylphosphino-2',6'-dimethoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl) palladium(II) dichloromethane adduct min. 98% [SPhos Palladacycle Gen. 4] (1599466-87-1)	250mg	See page 86
46-0385	Methanesulfonato(tri-t-butylphosphino)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [P(t-Bu) ₃ Palladacycle Gen. 4] (1621274-11-0)	250mg	See page 89
46-0388	Methanesulfonato[9,9-dimethyl-4,5-bis(diphenylphosphino)xanthene](2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [Xantphos Palladacycle Gen. 4] (1621274-19-8)	250mg	See page 87
46-0395	Methanesulfonato(2-dicyclohexylphosphino-2',6'-di-i-propoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl) palladium(II), min. 98% [RuPhos Palladacycle Gen. 4] (1599466-85-9)	250mg	See page 86

96-4050

CalB immo KIT™ - Immobilized enzyme

NEW

Store in dry conditions (2-8°C). Do not freeze. Shelf Life: 1 year;
Sold in collaboration with Purolite for research purposes only.
Components also available for individual sale.
Contains the following:

07-3130	CalB immo Plus™ - Immobilized enzyme	10g	See page 3
07-3142	CalB immo 8285™ - Immobilized enzyme	10g	See page 2
07-3148	CalB immo 8806™ - Immobilized enzyme	10g	See page 2
07-3152	CalB immo 5587™ - Immobilized enzyme	10g	See page 2
07-3155	CalB immo 1090™ - Immobilized enzyme	10g	See page 2
07-3159	CalB immo 5872™ - Immobilized enzyme	10g	See page 2

Item #	Immobilized on	Immobilization	Enzyme activity (PLU/g dry)
07-3130	DVB/methacrylate	Adsorption	>9,000
07-3142	Epoxy/butyl methacrylate	Covelent	>10,000
07-3148	Octadecyl methacrylate	Adsorption	>10,000
07-3152	Styrene/DVB copolymer	Adsorption	>4,000
07-3155	Macroporous styrene/DVB	Adsorption	>8,000
07-3159	Styrene/DVB	Adsorption	>3,500

Appearance: White to slightly yellow spherical beads, free from foreign matter

Principial Applications: Screening of immobilized lipases for process development, Esterifications (regio- and stereo-selective), Transesterfication, Amidation, Fats and oils modification

Advantages: Fast screening in process development, Wide selection of enzyme carriers for different applications

96-0445

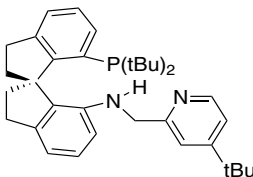
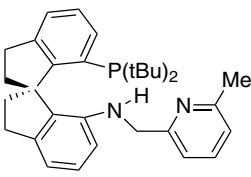
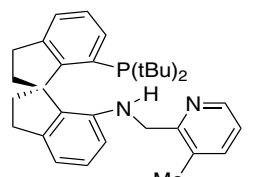
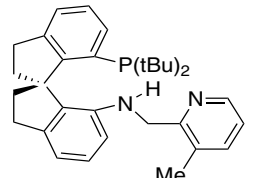
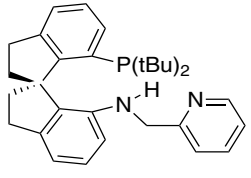
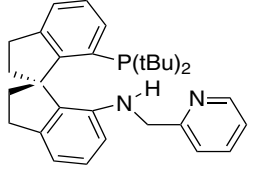
Chiral SpiroPAP Ligand Kit**NEW**

Also available: 77-4035 [Ir-(R)-DTB-SpiroPAP-3-Me] and 77-4036

[Ir-(S)-DTB-SpiroPAP-3-Me] (not part of the kit)

Components also available for individual sale.

Contains the following:

		
15-5147 25mg	15-5148 25mg	15-5158 25mg
		
15-5159 25mg	15-5166 25mg	15-5167 25mg

15-5147	(R)-(+)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(4-t-butylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP-4-t-Bu (1298133-38-6)	25mg	See page 92
15-5148	(R)-(+)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(6-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP-6-Me (1298133-26-2)	25mg	See page 94
15-5158	(R)-(+)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(3-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP-3-Me (1298133-36-4)	25mg	See page 93
15-5159	(S)-(-)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(3-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (S)-DTB-SpiroPAP-3-Me	25mg	See page 94
15-5166	(R)-(+)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(pyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP (1298133-21-7)	25mg	See page 94
15-5167	(S)-(-)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(pyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (S)-DTB-SpiroPAP (1415636-82-6)	25mg	See page 94

KITS

96-0070

NEW

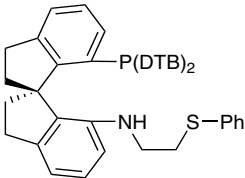
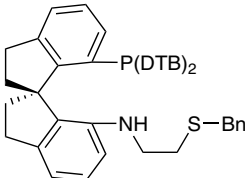
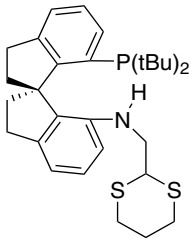
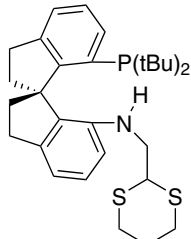
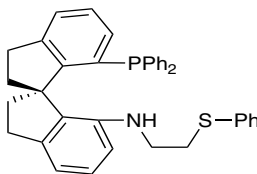
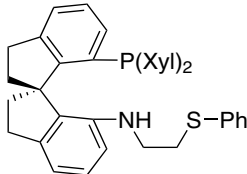
Chiral SpiroSAP Ligand Kit

Also available: 77-2510 [Ir-(R)-DTB-SpiroSAP] and 77-2511 [Ir-(S)-

DTB-SpiroSAP] (not part of the kit)

Components also available for individual sale.

Contains the following:

 15-1605 25mg	 15-1613 25mg	 15-1638 25mg	
 15-1639 25mg	 15-1643 25mg	 15-1645 25mg	
15-1605	(R)-(+)-7-[N-(2-Phenylthio)ethylamino]-7'-[bis(3,5-di-t-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-DTB-SpiroSAP-Ph] (1809609-38-8)	25mg	See page 108
15-1613	(R)-(+)-7-[N-(2-Benzylthio)ethylamino]-7'-[bis(3,5-di-t-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-DTB-SpiroSAP-Bn] (1809609-52-6)	25mg	See page 92
15-1638	(R)-(+)-7-[N-(1,3-Dithian-2-yl)methylamino]-7'-[bis(3,5-di-t-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-DTB-SpiroSAP] (1809609-53-7)	25mg	See page 108
15-1639	(S)-(-)-7-[N-(1,3-Dithian-2-yl)methylamino]-7'-[bis(3,5-di-t-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(S)-DTB-SpiroSAP]	25mg	See page 108
15-1643	(R)-(+)-7-[N-(2-Phenylthio)ethylamino]-7'-[diphenylphosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-Ph-SpiroSAP-Ph] (1809609-40-2)	25mg	See page 109
15-1645	(R)-(+)-7-[N-(2-Phenylthio)ethylamino]-7'-[bis(3,5-dimethylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-Xyl-SpiroSAP-Ph] (1809609-39-9)	25mg	See page 109

KITS

96-0255

Enzyme carrier Lifetech™ ECRKIT1

NEW

Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years;
This enzyme carrier kit allows rapid screening of different methods
of enzyme immobilization. Sold in collaboration with Purolite for
research purposes only.

Components also available for individual sale.

Contains the following:

06-0810	Enzyme carrier Lifetech™ ECR8204F	50g	See page 5
06-0828	Enzyme carrier Lifetech™ ECR8285	50g	See page 8
06-0913	Enzyme carrier Lifetech™ ECR1090M	50g	See page 4
06-0925	Enzyme carrier Lifetech™ ECR1030M	50g	See page 3
07-1512	Enzyme carrier Lifetech™ ECR8309F	50g	See page 5
07-1532	Enzyme carrier Lifetech™ ECR8806F	50g	See page 7

96-1549

Gold Gemini Nanorods Kit, CTAB Free (Wavelength 650-850 nm)

NEW

Rods are synthesized without CTAB. Store at 4°C - 8°C. Do not freeze.

At storage temperature the product may appear opaque. Follow the
procedure for re-dispersing surfactants as described in the technical note.

Complete this process before use to dissolve precipitated stabilizer. Sold
in collaboration with SONA Nanotech for research purposes only.

Components also available for individual sale.

Contains the following:

79-7010	Gold Gemini Nanorods, CTAB Free (Wavelength 650 nm) (7440-57-5)	5ml	See page 52
79-7015	Gold Gemini Nanorods, CTAB Free (Wavelength 700 nm) (7440-57-5)	5ml	See page 53
79-7020	Gold Gemini Nanorods, CTAB Free (Wavelength 750 nm) (7440-57-5)	5ml	See page 53
79-7025	Gold Gemini Nanorods, CTAB Free (Wavelength 800 nm) (7440-57-5)	5ml	See page 53
79-7030	Gold Gemini Nanorods, CTAB Free (Wavelength 850 nm) (7440-57-5)	5ml	See page 53

Item #	LPSR Maximum (nm)	Length (nm)	Width (nm)	Aspect Ratio	Color & Form
79-7010	640 - 670	25 - 31	13 - 18	1.7 - 1.9	violet liq.
79-7015	685 - 715	37 - 43	13 - 18	2.4 - 2.8	blue liq.
79-7020	735 - 765	37 - 44	10 - 13	3.4 - 3.7	red-purple liq.
79-7025	785 - 815	40 - 50	10 - 13	3.8 - 4.1	red-orange liq.
79-7030	835 - 865	48 - 55	9 - 12	4.6 - 5.3	maroon-purple liq.

Concentration: >30 µg/ml

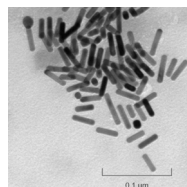
pH: 5.5 - 7.5

Stabilizer: Amphiphilic Agents

Solvent: Stabilized with amphiphilic agents in conductivity grade
water (18.0 MΩ cm⁻¹)

Optical Density: 1.0 - 1.2

Shelf Life: 12 months



KITS

96-7410

Graphene Quantum Dots (GQDs) Master Kit

NEW

Sold in collaboration with Dotz Nano Ltd. for research purposes only.
Suggested use within 6 months of purchase. Do not freeze. Store in DARK.
Components also available for individual sale.
Contains the following:

06-0330	Graphene Quantum Dots (GQDs), Aqua-Green Luminescent (1034343-98-0)	100mg	See page 54
06-0332	Graphene Quantum Dots (GQDs) in water, Aqua-Green Luminescent (1034343-98-0)	100ml	See page 55
06-0334	Graphene Quantum Dots (GQDs), Blue Luminescent (1034343-98-0)	100mg	See page 55
06-0336	Graphene Quantum Dots (GQDs) in water, Blue Luminescent (1034343-98-0)	100ml	See page 55
06-0338	Graphene Quantum Dots (GQDs), Cyan Luminescent (1034343-98-0)	100mg	See page 55
06-0340	Graphene Quantum Dots (GQDs) in water, Cyan Luminescent (1034343-98-0)	100ml	See page 55

96-7425

Graphene Quantum Dots (GQDs) Mini Kit (Powders)

NEW

Sold in collaboration with Dotz Nano Ltd. for research purposes only.
Suggested use within 6 months of purchase. Do not freeze. Store in DARK.
Components also available for individual sale.
Contains the following:

06-0330	Graphene Quantum Dots (GQDs), Aqua-Green Luminescent (1034343-98-0)	100mg	See page 54
06-0334	Graphene Quantum Dots (GQDs), Blue Luminescent (1034343-98-0)	100mg	See page 55
06-0338	Graphene Quantum Dots (GQDs), Cyan Luminescent (1034343-98-0)	100mg	See page 55

Item #	Color & Form	Photoluminescence			
		QY* *	λ max * *	Max emission	FWHM * *
06-0330	dark red-brown pwdr.	>17%	485 nm	525 nm	70 nm
06-0334	dark brown pwdr.	>65%	350 nm	445 nm	65 nm
06-0338	dark brown pwdr.	>25%	420 nm	490 nm	80 nm
Particle diameter: <5 nm					
Topographic height: 1.0 - 2.0 nm					
Abbreviations: QY* = Quantum Yield; λ max = Maximum excitation wavelength; FWHM = Full width at half maximum					

KITS

96-7420

Graphene Quantum Dots in water (GQDs) Mini Kit (Liquids)

NEW

Sold in collaboration with Dotz Nano Ltd. for research purposes only.

Suggested use within 6 months of purchase. Do not freeze. Store in DARK.

Components also available for individual sale.

Contains the following:

06-0332	Graphene Quantum Dots (GQDs) in water, Aqua-Green Luminescent (1034343-98-0)	100ml	See page 55
06-0336	Graphene Quantum Dots (GQDs) in water, Blue Luminescent (1034343-98-0)	100ml	See page 55
06-0340	Graphene Quantum Dots (GQDs) in water, Cyan Luminescent (1034343-98-0)	100ml	See page 55

Item #	Color & Form	Photoluminescence			
		QY* *	λ max * *	Max emission	FWHM * *
06-0332	cloudy orange liq.	>17%	485 nm	525 nm	70 nm
06-0336	cloudy colorless liq.	>65%	350 nm	445 nm	65 nm
06-0340	cloudy brown liq.	>25%	420 nm	490 nm	80 nm
Particle diameter: <5 nm Topographic height: 1.0 - 2.0 nm Concentration: 1mg/ml					
Abbreviations: QY* = Quantum Yield; λ max = Maximum excitation wavelength; FWHM = Full width at half maximum					

96-4065

Lipase immo Kit - Immobilized enzymes

NEW

The KIT contains 10g of each of the following:

- CalB immo Plus™ (Lipase from Candida antarctica B)*07-3130*
- CalA immo (Lipase from Candida antarctica A)
- TL immo (Lipase from Thermomyces lanuginosa)
- RM immo (Lipase from Rhizomucor miehei)
- CR immo (Lipase from Candida rugosa)
- PS immo (Lipase from Pseudomonas cepacia)

A selection of immobilized lipases on different Lifetech™ ECR enzyme carrier resins for screening purposes. Store in dry conditions (2-8°C). Do not freeze. Sold in collaboration with Purolite for research purposes only.

Principal Applications: Esterifications (regio - and stereo-selective), Transesterification, Kinetic resolution of racemic alcohols, amines, esters and triacylglycerides, Fats and oils modification, Hydrolysis of esters

Advantages: Fast screening in process development, Wide selection of immobilized lipases, Optimal for all applications in organic solvents

KITS

96-0397

Nitric Oxide Sensor (Extracellular) Kit ("NO-ON") (FL2A) (Cell-impermeable NO fluorescent probe)

NEW

Includes:

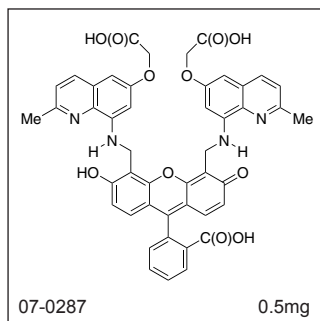
5 x 1ml Dimethylsulfoxide (ACS spectrophotometric grade): 97-4940

5 x 1ml Copper (II) chloride as a 1.0 mM solution in water: 97-3060

07-0287 packaged as 5 x 0.5mg

Components also available for individual sale.

Contains the following:



07-0287	2-{4,5-Bis[(6-(2-ethoxy-2-oxohydroxy)-2-methylquinolin-8-ylamino)methyl]-6-hydroxy-3-oxo-3H-xanthen-9-yl} benzoic acid FL2A (1239877-07-6)	0.5mg	See page 64
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96-0224

Novozymes Endoprotease Screening Kit (contains 6 endoprotease enzymes)

NEW

Store at 0-10°C. DO NOT FREEZE. Sold in collaboration with Novozymes

A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes

Components also available for individual sale.

Contains the following:

06-3110	Alcalase® 2.4 L FG (9014-01-1)	10g	See page 1
06-3112	Alcalase® 2.5 L (9014-01-1)	10g	See page 2
06-3115	Esperase® 8.0 L (9014-01-1)	10g	See page 9
06-3137	Savinase® 12 T (9014-01-1)	10g	See page 11
06-3150	Savinase® 16 L (9014-01-1)	10g	See page 11
06-3160	Neutrase® 0.8 L (9080-56-2)	10g	See page 9

Item#	Density	Activity	Formulation	Optimal Conditions	Substrate Specificity
06-3110	1.17	2.4 AU-A/g	Liquid	30-65°C, pH 7-9	Serine endopeptidase
06-3112	1.08	2.5 AU-A/g	Liquid	30-65°C, pH 7-10	Serine endopeptidase
06-3115	1.07	8 KNPU-E/g	Liquid	pH 8-12.5	Serine endopeptidase
06-3137	1.13	12 KNPU S/g	Granulate	30-70°C, pH 8-10	Serine endopeptidase
06-3150	1.16	16 KNPU S/g	Liquid	30-70°C, pH 8-10	Serine endopeptidase
06-3160	1.26	0.8 AU/g	Liquid	40-50°C, pH 7	Metalloprotease

Optimal storage is 0-10°C/32-50°F. If stored above 25°C/77°F the samples should be used within 3 months.

96-0220

NEW

Novozymes Lipase Screening Kit (contains 9 lipase enzymes)

Store at 0-10°C. DO NOT FREEZE. Sold in collaboration with Novozymes A/S. Novozymes does not promote nor support the use of enzymes as Active Pharmaceutical Ingredients or excipients. www.strem.com/novozymes
Components also available for individual sale.

Contains the following:

06-3100	NovoCor® AD L (9001-62-1)	10g	See page 10
06-3105	Lipozyme® CALB L (9001-62-1)	10g	See page 9
06-3118	Palatase® 20000 L (9001-62-1)	5g	See page 10
06-3120	Novozym® 40086 (9001-62-1)	5g	See page 10
06-3123	Novozym® 435 (9001-62-1)	5g	See page 10
06-3125	Resinase® HT (9001-62-1)	10g	See page 11
06-3135	Novozym® 51032 (9001-62-1)	10g	See page 10
06-3140	Lipozyme® TL 100 L (9001-62-1)	10g	See page 9
06-3155	Lipozyme® TL IM (9001-62-1)	10g	See page 9

Item#	Density	Activity	Formulation	Optimal Conditions	Substrate Specificity
06-3100	1.17	6000 LU/g	Liquid	30-60°C, pH 5-9	Sterically hindered esters
06-3105	1.20	5000 LU/g	Liquid	30-60°C, pH 5-9	Esters and alcohols
06-3118	1.19	20000 LU/g	Liquid	30-50°C, pH 7-10	Esters
06-3120	0.33	275 IUN/g	Immobilized Granulate	30-50°C, pH 7-10	Esters
06-3123	0.40	10000 PLU/g	Immobilized Granulate	30-60°C, pH 5-9	Esters and alcohols
06-3125	1.05	50 KLU/g	Liquid	up to 90°C, pH 5-8	Esters
06-3135	1.04	15 KLU/g	Liquid	35-70°C, pH 7-10	Esters
06-3140	1.05	100 KLU/g	Liquid	20-50°C, pH 7-10	Esters and diesters
06-3155	0.40	250 IUN/g	Immobilized Granulate	50-75°C, pH 6-8	Esters
Optimal storage is 0-10°C/32-50°F. If stored above 25°C/77°F the samples should be used within 3 months.					

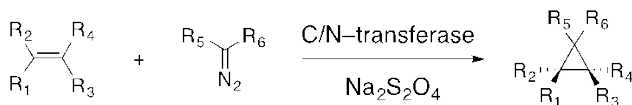
96-1580

NEW

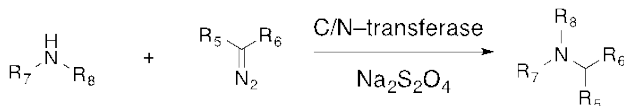
HAZ

Provi Carbene/Nitrene Transferase Screening Kit

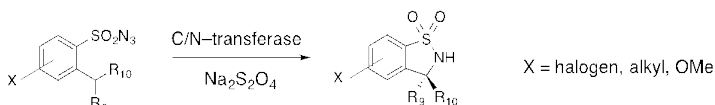
Store dry at -20°C. Sold under license from Provi for research purposes only.

1. Reactions Catalyzed

Synthesis of cyclopropanes via carbene transfer catalyzed by carbene/nitrene transferases.

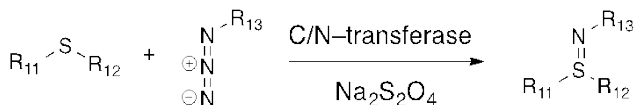


Synthesis of substituted amines via carbene transfer catalyzed by carbene/nitrene transferases.



X = halogen, alkyl, OMe

Synthesis of substituted benzosultams via nitrene transfer catalyzed by carbene/nitrene transferases.



Synthesis of sulfimides via nitrene transfer catalyzed by carbene/nitrene transferases.

2. Provivi C/N Transferase Screening Kit General Information

Provivi's proprietary enzymes can efficiently activate diazo and azide compounds to generate iron-carbenoids and iron-nitrenoids, respectively, through a mode of activation that has never been observed in nature. These intermediates can then react with a variety of substrates such as olefins, N-H bonds, C-H bonds, and sulfides, offering wide synthetic utility. After identifying initial activity on a reaction of interest, these enzymes can be further engineered and optimized (e.g. via directed evolution) to achieve high activity and stereoselectivity for a reaction of interest.

All reactions are best performed under anaerobic conditions. Cyclopropanes are synthesized by the reaction of a diazo carbene precursor (e.g. ethyl diazoacetate) with an olefin in the presence of a carbene/nitrene transferase as catalyst. The cyclopropanation instructions described in this technical note can be readily adapted for the other carbene and nitrene transfer reactions outlined above.

3. Provivi C/N Transferase Screening Kit Contents

- 24 vials (2 vials of each of 12 different enzymes, containing 50 nMoles of enzyme, enough for two screens) packed as lyophilized powders containing potassium phosphate in 2 ml screwcap vials
- 2 x 20 ml bottles containing 0.12 mMoles (25 mg) of 85% sodium dithionite (sodium hydrosulfite)

Each kit contains 12 different carbene/nitrene transfer enzymes as lyophilized powders together with potassium phosphate buffer. When reconstituted by the addition of deionized water and sodium dithionite as specified in the Screening Protocol in Section 4, each enzyme will be ready for immediate use under the desired reaction screening conditions: 50 nM/ml enzyme in 50mM potassium phosphate buffer, 10 mM sodium dithionite, pH 7.

Enzymes	PRVV-009	PRVV-010	PRVV-011	PRVV-013	PRVV-019	PRVV-032
	PRVV-034	PRVV-036	PRVV-040	PRVV-041	PRVV-042	PRVV-043

The enzymes should be stored dry at -20°C, and should be stable for more than 1 year under these conditions. We recommend that solutions of the enzymes be used the same day as they are prepared and not stored for extended periods of time. If storage of enzyme solutions is needed, we recommend storage at 4°C for periods of 1-2 days. For longer periods we recommend flash freezing the solutions and storage at -20°C.

4. Screening Protocol

1. Add 12ml of deionized (DI) water to the bottle containing sodium sithionite and dissolve by inversion.
2. Purge the sodium dithionite solution with nitrogen or argon by bubbling for 5 minutes. Sodium dithionite solutions should be made immediately prior to use and kept anaerobic, as sodium dithionite undergoes air oxidation over time.
3. Add 1 ml of purged dithionite solution to each enzyme vial.
4. Add alkene (either neat or dissolved as 20% w/v in methanol or ethanol) to achieve a 1% w/v final concentration (50 microliters of a 20% methanol/ethanol solution; final concentration of 10 mg alkene per ~1 ml reaction mixture). Do not worry if the alkene is not completely soluble. The reaction should still take place.
5. Add the diazo compound last (either neat or dissolved as 20% w/v in methanol or ethanol; ethyl diazoacetate is the most common choice and recommended as a positive control if another carbene precursor is used) to achieve 0.5% w/v final concentration (25 microliters of a 20% methanol/ethanol solution; 5mg diazo compound per ~1 ml reaction mixture) to initiate the reaction.
6. Allow reaction to proceed with mixing by shaking up to 800 rpm, taking samples at regular time points to analyze for product formation starting at 30 minutes. The reaction should be largely complete within 1-2 hours.
7. Samples may be quenched by the addition of each time point sample to an equal volume of extraction solvent (dichloromethane, hexane, and similar are recommended) for analysis by GC or HPLC. For a 1 ml reaction volume, samples of 0.2 ml can be withdrawn and diluted into 0.2 ml extraction solvent. If the product is water soluble, and/or if analysis will be by HPLC, quenching can be done by dilution of the sample into an equal volume of acetonitrile.

For tech support and questions: enzymes@provivi.com

5. Recommended Literature

Farwell, C.C., McIntosh, J.A., Hyster, T.K., Wang, Z.J. & Arnold, F.H., Enantioselective Imidation of Sulfides via Enzyme-Catalyzed Intermolecular Nitrogen-Atom Transfer *Journal of the American Chemical Society* **136**, 8766-8771 (2014).

Wang, Z.J., Renata, H., Peck, N.E., Farwell, C.C., Coelho, P.S. & Arnold, F.H., Improved Cyclopropanation Activity of Histidine-Ligated Cytochrome P450 Enables the Enantioselective Formal Synthesis of Levomilnacipran. *Angewandte Chemie Int Ed.* **126**, 6928-6931 (2014).

Wang, Z.J., Peck, N.E., Renata, H. & Arnold, F.H., Cytochrome P450-Catalyzed Insertion of Carbenoids into N-H Bonds. *Chemical Science (Royal Society of Chemistry : 2010)* **5**, 598-601 (2014).

Coelho, P.S., Brustad, E.M., Kannan, A. & Arnold, F.H., Olefin Cyclopropanation via Carbene Transfer Catalyzed by Engineered Cytochrome P450 Enzymes. *Science (New York, N.Y.)* **339**, 307-310 (2013).

Coelho, P.S., Wang, Z.J., Ener, M.E., Baril, S.A., Kannan, A., Arnold, F.H. & Brustad, E.M., A serine-substituted P450 catalyzes highly efficient carbene transfer to olefins in vivo. *Nature Chemical Biology* **9**, 485-487 (2013).

McIntosh J. A., Coelho, P.S., Farwell, C.C., Wang, Z.J., Lewis, J.C., Brown, T.R. & Arnold, F.H., Enantioselective intramolecular C-H amination catalyzed by engineered cytochrome P450 enzymes in vitro and in vivo. *Angewandte Chemie (International ed. in English)* **52**, 9309-9312 (2013).

LANTHANUM (Compounds)

57-0505 Lanthanum(III) bromide, anhydrous (99.99%-La) (REO) PURATREM

2g

NEW

(13536-79-3)

10g

LaBr₃; FW: 378.62; white xtl.

air sensitive, moisture sensitive

57-1200 Tris(N,N'-di-i-propylformamidinato)lanthanum(III), (99.999+%-La) PURATREM La-FMD (1034537-36-4)

1g

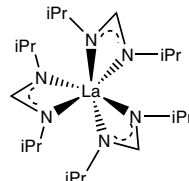
NEW

C₂₁H₄₈LaN₆; FW: 520.53; white to off-white powdr.

5g

air sensitive, moisture sensitive

Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard2.



Technical Note:

1. Lanthanum precursor for the ALD/CVD of La₂O₃, LaLuO₃, LaScO₃, and LaYO₃ thin films.

References:

1. *Appl. Phys. Lett.*, **2009**, 94, 262904
2. *Electrochem. Solid-State Lett.*, **2009**, 12, G13
3. *Appl. Phys. Lett.*, **2010**, 97, 162910
4. *J. Electrochem. Soc.*, **2011**, 158, H447
5. *ECS Trans.*, **2012**, 45, 95
6. *Nano Lett.*, **2013**, 13, 594
7. *J. Crystal Growth*, **2013**, 363, 150
8. *ECS Trans.*, **2013**, 54, 255
9. *App. Surface Sci.*, **2014**, 292, 880
10. *Proc. SPIE*, **2014**, 8987, 898712

LEAD (Compounds)

82-2155 Bis(1-dimethylamino-2-methyl-2-propanolate)lead(II), 98% Pb(DMAMP)₂ (934302-16-6)

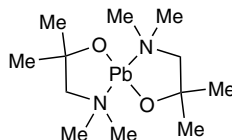
250mg

NEW

C₁₂H₂₈N₂O₂Pb; FW: 439.56; white solid

1g

5g



Technical Note:

1. Volatile compound used in the Chemical Vapor Deposition of lead oxide.

References:

1. *Eur. J. Org. Chem.*, **2014**, 2014, 1327

LEAD (Compounds)

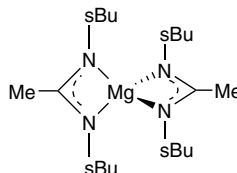
82-2180	Methylammonium triiodoplumbate(II) (40wt% solution in DMF)	2g
NEW	(99.99+%-Pb) (69507-98-8)	10g
HAZ	[CH ₃ NH ₃] ⁺ PbI ₃ ⁻ ; FW: 616.96; clear yellow liq.; d. 1.368	

LUTETIUM (Compounds)

71-1080	Tris(2,2,6,6-tetramethyl-3,5-heptanedionato)lutetium(III), 99%	1g
NEW	(99.9+%-Lu) (REO) [Lu(TMHD) ₃] (15492-45-2)	5g
	Lu(C ₁₁ H ₁₉ O ₇) ₃ ; FW: 724.76; off-white xtl.	25g

MAGNESIUM (Compounds)

12-0845	Bis(N,N'-di-sec-butylacetamidinato)magnesium, 99%	1g
NEW	C ₂₀ H ₄₂ MgN ₄ ; FW: 362.88; colorless to pale yellow liq. <i>moisture sensitive</i>	5g
	Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard2	

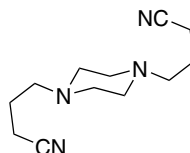


MANGANESE (Compounds)

25-1250	Manganese(II) bromide, bis(tetrahydrofuran), min. 98% (57298-42-7)	1g
NEW	MnBr ₂ (C ₄ H ₈ O) ₂ ; FW: 358.96; light pink-orange powdr. <i>moisture sensitive</i>	5g
		25g
25-1345	Manganese(II) chloride anhydrous (99.995%-Mn) PURATREM	5g
NEW	(7773-01-5)	25g
	MnCl ₂ ; FW: 125.84; pink solid; m.p. 650°; b.p. 1190°; d. 2.98	100g
	<i>hygroscopic</i>	

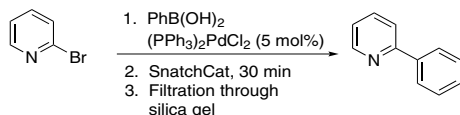
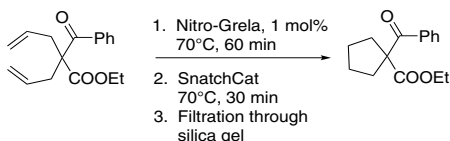
METALS SCAVENGING AGENTS (Compounds)

07-2203	1,4-Bis(2-isocyanopropyl)piperazine (SnatchCat Metal Scavenger) (51641-96-4)	1g
NEW	C ₁₂ H ₂₀ N ₄ ; FW: 220.31; white xtl. <i>(store cold)</i>	5g
	Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 14/443,048; PCT/IB2014/062564.	



Technical Note:

1. SnatchCat represents a universal tool for metal removal with a proven efficiency for Ru and Pd metals. The product is an immediate metathesis reaction quencher, allowing reduced metal content to 10ppm after 20 min scavenging time and a simple workup by silica gel filtration. Compatible with a broad range of functional groups and solvents, the product is stable, non-toxic, non-volatile and odor-free.



Tech. Note (1)
Ref. (1)

References:

1. *ChemSus Chem.*, **2015**, 8, 4139.

METALS SCAVENGING AGENTS (Compounds)

06-1522 NEW	Chelating/scavenger resin with aminophosphonic - S940 spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 425-850 micron; Purolite S940 is a chelating resin of macroporous structure, with a polystyrene matrix crosslinked with divinylbenzene (DVB) substituted with weakly acidic aminophosphonic active groups. This chemical structure facilitates the formation of complexes with metallic ions. The aminophosphonic chelating resins have a greater affinity for certain cations, and form more stable complexes with cations of low atomic mass metals than their iminodiacetic resin counterparts. Hence Purolite S940 is capable of fixing one or more specific cations from a larger range even from solutions which are highly concentrated. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
06-1525 NEW	Chelating/scavenger resin with aminophosphonic - S950 spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1000 micron; Purolite S950 is a macroporous aminophosphonic acid chelating resin, designed for the removal of cations of toxic metals such as lead, copper and zinc from industrial effluents at low pH. At somewhat higher pH values, calcium, magnesium and barium, as well as the toxic metals cadmium, nickel, and cobalt are strongly complexed and may be separated from quite high concentrations of univalent cations. Purolite S950 is highly selective (under the appropriate conditions) for a range of both heavy metal and common divalent ions. Hence its use may be recommended where it is necessary to remove calcium or magnesium in order to avoid possible precipitation, or where its selectivity for a particular range of metals offers advantages. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
06-1508 NEW	Chelating/scavenger resin with aminoxime - S910 spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1200 micron; Purolite® S910 is an amidoxime chelating resin, designed for the removal of cations of metals such as copper and iron from water or other solvent even at relatively low pH. It can also be used for the recovery of traces of precious metals from dilute solutions. It cannot be used for removal of alkaline earth metals. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
06-1530 NEW	Chelating/scavenger resin with bispicolylamine - S960 spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 425-1000 micron; Purolite® S960 is a macroporous poly-styrene divinylbenzene copolymer within which weakly basic bis-picolylamine chelating functional groups are covalently bonded. This resin has high selectivity for valuable metals such as nickel, copper, and cobalt as compared to iron, aluminum, calcium, and magnesium. Purolite® S960 is active within the pH range of 0-8 and may function outside that range depending on the metals involved. Sold in collaboration with Purolite for research purposes only.	50g 5x50g

METALS SCAVENGING AGENTS (Compounds)

06-1520

NEW

Chelating/scavenger resin with iminodiacetic - S930Plus

spherical beads (wet)

(store cold)

Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 425-1000 micron; Purolite S930Plus is a macroporous polystyrene; based chelating resin, with iminodiacetic groups designed for the removal of heavy metals from industrial effluents. Purolite S930Plus finds use in processes for extraction and recovery of metals from ores, galvanic plating solutions, pickling baths and effluents. Further uses include the decalcification of brine for chloralkali processes, where Purolite S930Plus shows advantages under certain operating conditions over the typically used aminophosphonic type resins such as Purolite S940. Purolite S930Plus has high selectivity and capacity for hardness and strontium and has excellent osmotic stability. Purolite S930Plus is susceptible to oxidation. Hence direct treatment of brine solutions containing free chlorine should be avoided, for instance by preliminary reaction with sulphur dioxide, sulphide or, by use of a treatment with activated carbon. Brine solutions can often contain significant concentrations of chlorates. In this case it is necessary to ensure that the displacement rinse prior to the acid regeneration is efficient, so as to avoid the formation of free chlorine from contact of chlorates in the brine solution with the regeneration acid. Sold in collaboration with Purolite for research purposes only.

50g

5x50g

06-1514

NEW

Chelating/scavenger resin with isothiuronium - S920Plus

spherical beads (wet)

(store cold)

Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1200 micron; Purolite® S920Plus is a macroporous polystyrenic based chelating resin, with thiouronium groups designed for the selective removal of mercury and for the recovery of precious metals from industrial effluents. Mercury is strongly bound to the functional groups to form highly stable complexes, with high selective affinity compared with those of other heavy metals. These properties are largely unaffected by high chloride (or sulfate) content of the effluent. Effluent solutions which may typically contain 2 - 20 ppm of mercury can be treated to reduce the concentration in solution to less than 0.005 ppm. Purolite S920Plus can load up to 200g of mercury, or gold, or approximately 60g of platinum or palladium for each liter of resin, equivalent to 12.5, and 3.75 lb/ft³ respectively. Purolite S920Plus is designed for the removal of low concentrations of soluble mercury salts from waste streams and for the recovery of precious metals from rinse waters in the galvanic and electronic industries. It is also used in hydrometallurgy for the separation of precious metals from acid liquors. Mercury and precious metals are so strongly held, and run lengths are so long (thousands of hours) that it is not normally considered economic to regenerate the resin for reuse. Purolite S920Plus is more resistant to oxidation than many thiol based resins and contact with the atmosphere is not detrimental, however free chlorine and other strong oxidizing agents may damage the resin and their removal from solution by filtering through activated carbon is recommended. Sold in collaboration with Purolite for research purposes only.

50g

5x50g

06-1501

NEW

Chelating/scavenger resin with N-methylglucamine - S108

spherical beads (wet)

(store cold)

Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 425-630 micron; Purolite® S108 is a macroporous polystyrenic based resin with excellent kinetics and functional groups specially designed for the selective removal of salts of boron from aqueous solutions. It is effective for such solutions over a wide range of pH values, and over a wide range of boron concentrations. The presence of boron ions in water for potable and agriculture/horticulture use, even in relatively small (ppm) concentrations can give rise to major problems. Even where concentrations of other ions are reasonably high, Purolite® S108 will reduce boron concentrations by an order of magnitude. Sold in collaboration with Purolite for research purposes only.

50g

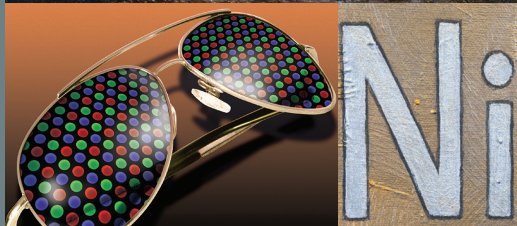
5x50g

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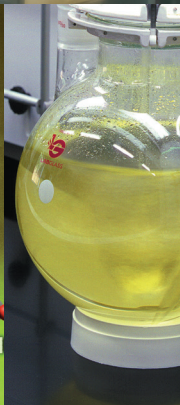
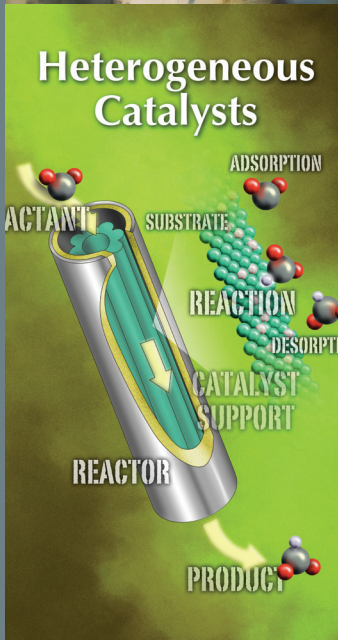
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METALS SCAVENGING AGENTS (Compounds)

06-1528 NEW	Chelating/scavenger resin with phosphonic and sulfonic acid - S957 spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 425-1000 micron; Purolite S957 is a specially developed Monophos chelating resin, which incorporates phosphonic, and sulfonic functional groups on a mechanically and osmotically resistant matrix. These combined properties give it high selectivity for iron and other transitional metals, even in acidic solutions. Purolite S957 has been especially designed for the selective removal of ferric iron from acidic solutions, such as copper electrolyte or from nickel, cobalt and zinc processing solutions. Purolite S957 can also be used in potable water applications for the selective removal of trace levels of selected metals from neutral pH waters. Its selectivity for uranium and other lanthanide elements should give good opportunities for its successful employment in other areas. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
06-1532 NEW	Chelating/scavenger resin with polyamine - S985 spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1200 micron; Purolite® S985 is a high capacity, macroporous, weak base anion exchange resin with a polyacrylic matrix supporting functional groups of the polyamine type. The carefully formulated, macroporous acrylic matrix ensures excellent exchange kinetics for the removal of trace heavy metals from waste water streams and the special polyamine functionality produces very interesting operating capacities and makes the uptake of metallic cations possible even when they are present in the waste stream as organic anionic complexes. Its tough and resilient macroporous structure also affords excellent mechanical, strength and resistance to osmotic shock. Sold in collaboration with Purolite for research purposes only.	50g 5x50g
06-1518 NEW	Chelating/scavenger resin with thiol - S924 spherical beads (wet) <i>(store cold)</i> Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1000 micron; Purolite S924 is a chelating resin, polystyrene based and designed for the selective removal of mercury. The mercury is strongly bound to the functional groups to form highly stable complexes with high selective affinity compared with those of other heavy metals. Even so the high selectivity for metals such as silver, copper, lead, cadmium, nickel and cobalt, makes this resin useful in waste treatment and hydrometallurgical processes. The high selectivity for mercury is largely unaffected by high chloride or sulphate content of the effluent. Effluent solutions that may typically contain 0.01-25ppm of mercury can be treated to reduce the concentration to significantly less than 5ppb residual mercury. Purolite S924 can load up to 150 g (16 lb/cu.ft) of mercury per litre of resin. Purolite S924 is designed for the removal of moderately low concentrations of soluble mercury salts from brine streams used to produce caustic soda and chlorine where mercury cells are used, and may be regenerated with concentrated hydrochloric acid solutions. In the process for the manufacture of caustic soda and chlorine from brine, where all or part of the production uses mercury cells, the mercury rich regenerant acid may be neutralized with the sodium hydroxide to produce a recovered brine solution that may be recycled to the mercury cell process. Mercury may be present at very low concentrations and consequently run lengths are often long (thousands of hours). It is sometimes not economic to regenerate the resin for re-use. In such cases Purolite S920 may be preferred because of its higher capacity. Purolite S924 is prone to oxidation and long-term contact with the atmosphere is detrimental. It is recommended that this resin is shipped and stored under water. Also, free chlorine and other strong oxidizing agents may damage the resin. Their removal from solution by filtering through activated carbon is recommended. Sold in collaboration with Purolite for research purposes only.	50g 5x50g

METALS SCAVENGING AGENTS (Compounds)

06-1512	Chelating/scavenger resin with thiourea - S914	50g
NEW	spherical beads (wet) (store cold) Note: Store in dry conditions (2-20°C). Do not freeze. Shelf Life: 5 years; Particle Size: 300-1200 micron; Purolite S914 is a macroporous type chelating resin with thiourea functionality. It has very high selectivity for mercury and platinum group metals such as platinum, gold and silver. Purolite S914 is stable over the whole pH range. The applications include mercury removal from brine and effluent in chloralkali process, mercury removal from flue gas scrubber effluent, recovery of platinum group metals from effluents amongst others. Sold in collaboration with Purolite for research purposes only.	5x50g

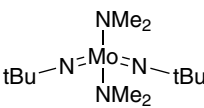
MOFS AND LIGANDS FOR MOF SYNTHESIS (Compounds)

08-1220	2,5-Dihydroxyterephthalic acid, 98% H₄DOBDC (610-92-4)	
	See page 71	
26-3725	Iron azobenzene tetracarboxylic, Porous [PCN-250(Fe)], CONEKTIC™ F250 (1771755-22-6)	
	See page 33	
26-2340	Iron(III) 1,3,5-benzenetricarboxylate hydrate, porous (F-free MIL-100(Fe), KRICT F100) [Iron trimesate] (1257379-83-1)	
	See page 34	
08-1235	2,6-Naphthalenedicarboxylic acid, min. 98% (1141-38-4)	
	See page 72	

MOLECULAR SIEVES

14-8820	SBA-15 Molecular Sieve (7631-86-9)	1g
NEW	SA: 600-800 m ² /g	5g

MOLYBDENUM (Compounds)

42-9028	Bis(acetonitrile)tetracarbonylmolybdenum(0), 98% (14126-87-5)	250mg
NEW	C ₈ H ₆ N ₂ O ₄ Mo; FW: 290.08; yellow solid air sensitive	1g 5g
42-0215	Bis(t-butylimido)bis(dimethylamino) molybdenum(VI), 98% (923956-62-1)	500mg
NEW	C ₁₂ H ₃₀ MoN ₄ ; FW: 326.33; orange liq. air sensitive, moisture sensitive (store cold)	2g
		
42-1550	Molybdenum disilicide, 0.4-5.0 microns (99+%-Mo) (12136-78-6)	50g
NEW	MoSi ₂ ; FW: 152.13; black solid	250g

NANOMATERIALS (Elemental Forms)

79-7010	Gold Gemini Nanorods, CTAB Free (Wavelength 650 nm) (7440-57-5)	5ml
NEW	Au; violet liq. light sensitive, (store cold) Note: Rods are synthesized without CTAB. Store at 4°C - 8°C. Do not freeze. At storage temperature the product may appear opaque. Follow the procedure for re-dispersing surfactants as described in the technical note. Complete this process before use to dissolve precipitated stabilizer. Sold in Collaboration with SONA Nanotech for research purposes only. Gold Gemini Nanorods Kit component.	25ml

NANOMATERIALS (Elemental Forms)

79-7015 NEW	Gold Gemini Nanorods, CTAB Free (Wavelength 700 nm) (7440-57-5) Au; blue liq. <i>light sensitive, (store cold)</i> Note: Rods are synthesized without CTAB. Store at 4°C - 8°C. Do not freeze. At storage temperature the product may appear opaque. Follow the procedure for re-dispersing surfactants as described in the technical note. Complete this process before use to dissolve precipitated stabilizer. Sold in Collaboration with SONA Nanotech for research purposes only. Gold Gemini Nanorods Kit component.	5ml 25ml
79-7020 NEW	Gold Gemini Nanorods, CTAB Free (Wavelength 750 nm) (7440-57-5) Au; red-purple liq. <i>light sensitive, (store cold)</i> Note: Rods are synthesized without CTAB. Store at 4°C - 8°C. Do not freeze. At storage temperature the product may appear opaque. Follow the procedure for re-dispersing surfactants as described in the technical note. Complete this process before use to dissolve precipitated stabilizer. Sold in Collaboration with SONA Nanotech for research purposes only. Gold Gemini Nanorods Kit component.	5ml 25ml
79-7025 NEW	Gold Gemini Nanorods, CTAB Free (Wavelength 800 nm) (7440-57-5) Au; red-orange liq. <i>light sensitive, (store cold)</i> Note: Rods are synthesized without CTAB. Store at 4°C - 8°C. Do not freeze. At storage temperature the product may appear opaque. Follow the procedure for re-dispersing surfactants as described in the technical note. Complete this process before use to dissolve precipitated stabilizer. Sold in Collaboration with SONA Nanotech for research purposes only. Gold Gemini Nanorods Kit component.	5ml 25ml
79-7030 NEW	Gold Gemini Nanorods, CTAB Free (Wavelength 850 nm) (7440-57-5) Au; maroon-purple liq. <i>light sensitive, (store cold)</i> Note: Rods are synthesized without CTAB. Store at 4°C - 8°C. Do not freeze. At storage temperature the product may appear opaque. Follow the procedure for re-dispersing surfactants as described in the technical note. Complete this process before use to dissolve precipitated stabilizer. Sold in Collaboration with SONA Nanotech for research purposes only. Gold Gemini Nanorods Kit component.	5ml 25ml
96-1549	Gold Gemini Nanorods Kit, CTAB Free (Wavelength 650-850 nm) See page 41	
79-0921	Gold nanoparticles, 1% on carbon black (surfactant and reactant-free) (7440-57-5) See page 18	
79-0916	Gold nanoparticles, 1% on Titania (anatase) (surfactant and reactant-free) (7440-57-5) See page 18	
79-0905	Gold nanoparticles, 1% on Titania (rutile) (surfactant and reactant-free) (7440-57-5) See page 18	
79-0926	Gold nanoparticles, 5% on carbon black (surfactant and reactant-free) (7440-57-5) See page 18	
79-0935	Gold nanoparticles, 10% on Titania (anatase) (surfactant and reactant-free) (7440-57-5) See page 18	
79-0930	Gold nanoparticles, 10% on Titania (rutile) (surfactant and reactant-free) (7440-57-5) See page 19	
06-0310	Graphene film, monolayer, on Si/SiO₂ wafer (1cm x1cm), by CVD (1034343-98-0) See page 12	
06-0222	Graphene nanoplatelets, (2-10nm thick x ~5 microns wide) (1034343-98-0) See page 12	
06-0323	Graphene oxide (0.8-1.2nm thick x 1-15 microns wide, made by the Staudenmaier Method) See page 12	

NANOMATERIALS (Elemental Forms)

06-2545 Graphene oxide (4mg/ml water dispersion) (1034343-98-0)

See page 12

06-2550 Graphene oxide, reduced (1034343-98-0)

See page 12

06-0318 Graphene powder (1-5 layers thick x 0.5-5 microns wide, surface area 650-750 m²/g) (1034343-98-0)

See page 12

06-0313 Graphene powder (single layer, surface area 400-1000 m²/g) (1034343-98-0)

See page 12

06-0330 Graphene Quantum Dots (GQDs), Aqua-Green Luminescent (1034343-98-0)

100mg

NEW

C; dark red-brown powdr.

light sensitive, (store cold)

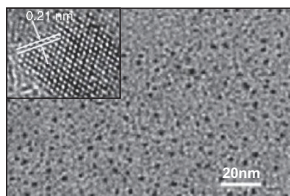
Note: Particle diameter: <5 nm. Sold in collaboration with Dotz Nano Ltd. for research purposes only. Suggested use within 6 months of purchase. Do not freeze. Store in DARK.

Suggested Applications:

Graphene quantum dots (GQDs), sheets of few-layered graphene and lateral dimensions smaller than 100nm possess strong quantum confinement and edge effects. Thus, they possess unique physical properties such as strong photoluminescence, which can be tailored for specific applications by controlling their size, shape, defects and functionality.

In contrast to classic QDs, such as metal or silicon quantum dots, GQDs are biocompatible, photostable and inherit superior thermal, electrical and mechanical properties from the graphene. These features can greatly contribute to various state-of-the-art applications: optical brighteners, taggants for security applications¹, bioimaging markers², fluorescent polymers³, antibacterial⁴, antibiofouling⁵, and disinfection systems⁶, heavy metals⁷, humidity and pressure⁸ sensors, batteries⁹, flash memory devices¹⁰, photovoltaic devices¹¹ and light-emitting diodes¹².

Item #	Photoluminescence			
	QY* *	$\lambda_{\max}$ *	Max emission	FWHM *
06-0330 / 06-0332	>17%	485 nm	525 nm	70 nm
06-0334 / 06-0336	>65%	350 nm	445 nm	65 nm
06-0338 / 06-0340	>25%	420 nm	490 nm	80 nm
Abbreviations				
	QY*	Quantum Yield		
	$\lambda_{\max}$	Maximum excitation wavelength		
	FWHM	Full width at half maximum		



References:

1. <http://onlinelibrary.wiley.com/doi/10.1002/anie.201206791/abstract>
2. <http://onlinelibrary.wiley.com/doi/10.1002/ppsc.201400219/abstract>
3. <http://pubs.acs.org/doi/abs/10.1021/acsami.5b06057>
4. <http://pubs.acs.org/doi/abs/10.1021/acsami.6b01765>
5. <http://www.nature.com/articles/srep20142>
6. <http://pubs.acs.org/doi/abs/10.1021/nn501640q>
7. <http://www.sciencedirect.com/science/article/pii/S0013468615000468>
8. <http://pubs.acs.org/doi/abs/10.1021/nl4003443>
9. <http://pubs.acs.org/doi/abs/10.1021/nl504038s>
10. <http://iopscience.iop.org/article/10.1088/0957-4484/25/25/255203/meta>
11. <http://onlinelibrary.wiley.com/doi/10.1002/anie.200906291/abstract>
12. <http://link.springer.com/article/10.1007/s10853-012-7016-8>

NANOMATERIALS (Elemental Forms)

06-0332	Graphene Quantum Dots (GQDs) in water, Aqua-Green Luminescent (1034343-98-0)	100ml
NEW	C; cloudy orange liq. <i>light sensitive, (store cold)</i> Note: Particle diameter: <5 nm. Concentration: 1 mg/ml. Sold in collaboration with Dotz Nano Ltd. for research purposes only. Suggested use within 6 months of purchase. Do not freeze. Store in DARK.	

Technical Note:

1. See 06-0330 (page 54)

06-0334	Graphene Quantum Dots (GQDs), Blue Luminescent (1034343-98-0)	100mg
NEW	C; dark brown powdr. <i>light sensitive, (store cold)</i> Note: Particle diameter: <5 nm. Sold in collaboration with Dotz Nano Ltd. for research purposes only. Suggested use within 6 months of purchase. Do not freeze. Store in DARK.	

Technical Note:

1. See 06-0330 (page 54)

06-0336	Graphene Quantum Dots (GQDs) in water, Blue Luminescent (1034343-98-0)	100ml
NEW	C; cloudy colorless liq. <i>light sensitive, (store cold)</i> Note: Particle diameter: <5 nm. Concentration: 1 mg/ml. Sold in collaboration with Dotz Nano Ltd. for research purposes only. Suggested use within 6 months of purchase. Do not freeze. Store in DARK.	

Technical Note:

1. See 06-0330 (page 54)

06-0338	Graphene Quantum Dots (GQDs), Cyan Luminescent (1034343-98-0)	100mg
NEW	C; dark brown powdr. <i>light sensitive, (store cold)</i> Note: Particle diameter: <5 nm. Sold in collaboration with Dotz Nano Ltd. for research purposes only. Suggested use within 6 months of purchase. Do not freeze. Store in DARK.	

Technical Note:

1. See 06-0330 (page 54)

06-0340	Graphene Quantum Dots (GQDs) in water, Cyan Luminescent (1034343-98-0)	100ml
NEW	C; cloudy brown liq. <i>light sensitive, (store cold)</i> Note: Particle diameter: <5 nm. Concentration: 1 mg/ml. Sold in collaboration with Dotz Nano Ltd. for research purposes only. Suggested use within 6 months of purchase. Do not freeze. Store in DARK.	

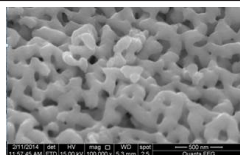
Technical Note:

1. See 06-0330 (page 54)

96-7410	Graphene Quantum Dots (GQDs) Master Kit (1034343-98-0)	
	See page 41	
96-7425	Graphene Quantum Dots (GQDs) Mini Kit (Powders) (1034343-98-0)	
	See page 42	
96-7420	Graphene Quantum Dots in water (GQDs) Mini Kit (Liquids) (1034343-98-0)	
	See page 43	
06-2510	Monolayer Graphene on Cu (10 mm x 10 mm) (1034343-98-0)	
	See page 13	
06-2518	Monolayer Graphene on Cu (60 mm x 40 mm) (1034343-98-0)	
	See page 13	
06-2523	Monolayer Graphene on Cu with PMMA coating (60mm x 40mm) (1034343-98-0)	
	See page 13	
06-2534	Monolayer Graphene on SiO₂/Si (10mm x 10mm) (1034343-98-0)	
	See page 13	
28-0015	Nickel/palladium alloy nanoparticle on graphene (G-Ni₃₃Pd₆₇)	
	See page 72	

NANOMATERIALS (Elemental Forms)

78-3015	Platinum nanoparticles, 1% on carbon black (surfactant and reactant-free) (7440-06-4) See page 114	
78-3020	Platinum nanoparticles, 5% on carbon black (surfactant and reactant-free) (7440-06-4) See page 114	
78-3030	Platinum nanoparticles, 10% on carbon black (surfactant and reactant-free) (7440-06-4) See page 114	
78-3032	Platinum nanoparticles, 20% on carbon black (surfactant and reactant-free) (7440-06-4) See page 114	
78-3035	Platinum nanoparticles, 30% on carbon black (surfactant and reactant-free) (7440-06-4) See page 114	
78-3012	Platinum nanoparticles, 1% on Titania (anatase) (surfactant and reactant-free) (7440-06-4) See page 114	
78-3005	Platinum nanoparticles, 1% on Titania (rutile) (surfactant and reactant-free) (7440-06-4) See page 114	
78-3026	Platinum nanoparticles, 10% on Titania (anatase) (surfactant and reactant-free) (7440-06-4) See page 114	
78-3023	Platinum nanoparticles, 10% on Titania (rutile) (surfactant and reactant-free) (7440-06-4) See page 114	
47-0645	Silver Nano-Porous Catalyst (promoted with zirconium oxide) Ag; grey powdr. Note: Sold under license from OXENERGY for research purposes only. US Patent No 8,142,938.	1g 5g 25g



Specifications:

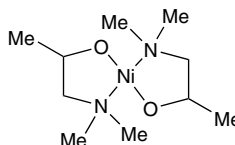
Average cluster (particle) size, micron:12-17; Average cluster porosity, %:38-42; Average pore size, nm: 30-50; Specific surface area, m²/g:/ 6.0-7.0; Apparent density, g/ml: 0.9-1.1

NANOMATERIALS (Compounds)

77-0030	Antimony Tin Oxide/Iridium Het-WOC core/shell nanopowder, 20 nm (conductive and acid-stable) See page 23	
77-0035	Antimony Tin Oxide/Iridium Het-WOC core/shell nanopowder, 50 nm (conductive and acid-stable) See page 23	
77-0040	Antimony Tin Oxide/Iridium Het-WOC core/shell nanopowder, 100 nm (conductive and acid-stable) See page 23	
50-0518	Tin(IV) oxide, nanoparticle (30-60 nm), (99.7%-Sn) (18282-10-5) SnO ₂ ; FW: 150.69; white powdr.; SA: 18.55 m ² /g; m.p. 1630°; d. 6.95	25g 100g

NICKEL (Compounds)

28-0025	Bis[1-(N,N-dimethylamino)-2-propanolato] nickel(II), 99% NiDMAP (200284-92-0) C ₁₀ H ₂₄ N ₂ NiO ₂ ; FW: 263.00; green xtl.	500mg 2g
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NICKEL (Compounds)

28-1720

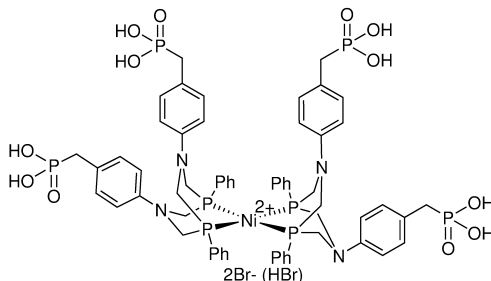
NEW

Bis(P,P'-1,5-diphenyl-3,7-bis[(4-hydrogenphosphonate)phenyl]-1,5,3,7-diazadiphosphocine} nickel(II) bromide (hydrogen bromide adduct) (1514896-39-9)

$C_{60}H_{66}Br_3N_4NiO_{12}P_8$; FW: 1584.41; red-brown xtls.
air sensitive, moisture sensitive

5mg

25mg



Technical Notes:

1. Synthetic nickel catalyst used for photocatalytic reduction of aqueous protons to hydrogen.
2. Catalyst containing phosphonate anchor groups for immobilization on metal oxide semiconductor surfaces, enabling light-driven hydrogen evolution.

References:

1. *Angew. Chem. Int. Ed.*, **2014**, 53, 11538
2. *J. Amer. Chem. Soc.*, **2014**, 136, 356

28-0096

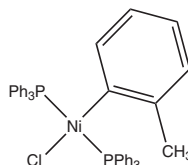
NEW

Bis(triphenylphosphino)(2-methylphenyl)chloronickel(II), 99% (27057-09-6)

$C_{43}H_{37}ClNiP_2$; FW: 709.85; yellow powder.

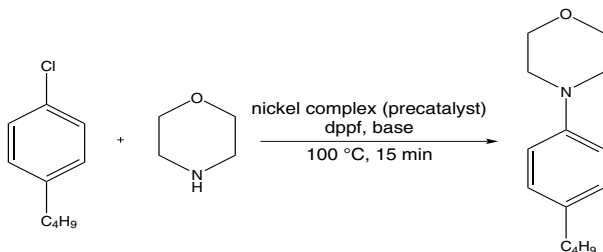
250mg

1g

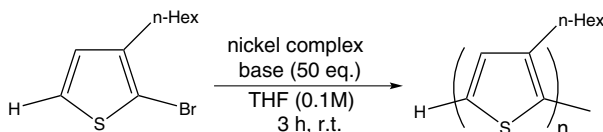


Technical Notes:

1. This complex is used as an air-stable nickel precatalyst for the amination of aryl chlorides, sulfamates, mesylates, and triflates.
2. This nickel precatalyst is used for the polymerization of halothiophenes.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

1. *Org. Lett.*, **2014**, 16, 220
2. *Organometallics*, **2012**, 31, 2263

28-0110

NEW

Chlorobis(triphenylphosphino)phenylnickel(II), 98% (33571-43-6)

$C_{42}H_{35}ClNiP_2$; FW: 695.78; yellow powder.
air sensitive, moisture sensitive

500mg

2g

NICKEL (Compounds)

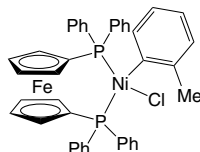
Technical Notes:

1. Self-immobilizing, binuclear neutral nickel catalyst for ethylene polymerization.
2. Ligand steric and electronic effects on β -ketiminato neutral nickel(II) olefin polymerization catalysts.
3. Accessible, highly active single-component β -ketiminato neutral nickel(II) catalysts for ethylene polymerization.
4. Highly active neutral nickel(II) catalysts for ethylene polymerization bearing modified β -ketoiminato ligands.

References:

1. *J. Mol. Catal. A: Chem.*, **2013**, 380, 139
2. *Organometallics*, **2012**, 31, 966
3. *Organometallics*, **2010**, 29, 2306
4. *Organometallics*, **2009**, 28, 5697

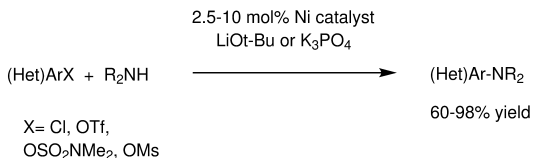
28-0518 **Chloro(2-methylphenyl)[1,1'-bis(diphenylphosphino)ferrocene]nickel (II), 98%**
 (1501945-23-8)
 $C_{41}H_{35}ClFeNiP_2$; FW: 739.66; yellow powdr.
air sensitive



100mg
500mg

Technical Note:

1. Air-stable nickel precatalyst for the amination of aryl chlorides, sulfamates, mesylates and triflates.

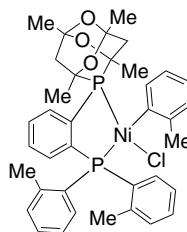


Tech. Note (1)
Ref. (1)

References:

1. *Org. Lett.*, **2014**, 16, 220.

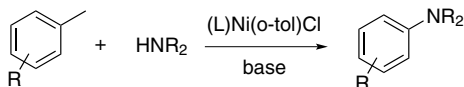
28-1090 **Chloro(2-methylphenyl)[1,3,5,7-tetramethyl-8-(2-di-o-tolylphosphinophenyl)-2,4,6-tri-oxa-8-phosphaadamantane]nickel(II), Stradiotto PAd-DalPhos Nickel Catalyst (1902911-45-8)**
 $C_{37}H_{41}ClNiO_3P_2$; FW: 689.81; brown powdr.
 Note: Patent No. 62/171,370



250mg
1g

Technical Note:

1. Catalyst used for C-N cross-coupling.

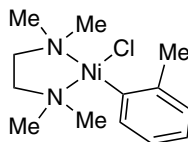


Tech. Note (1)
Ref. (1)

References:

1. *Organometallics*, **2016**, 35, 3248.

28-0165 **Chloro(2-methylphenyl)(N,N,N',N'-tetramethyl-1,2-ethylenediamine)nickel(II), 99% (contains about 5% o-chlorotoluene) NiCl(o-tolyl)(TMEDA)**
 (1702744-45-3)
 $C_{13}H_{23}ClN_2Ni$; FW: 301.48; dark-orange powdr.
air sensitive

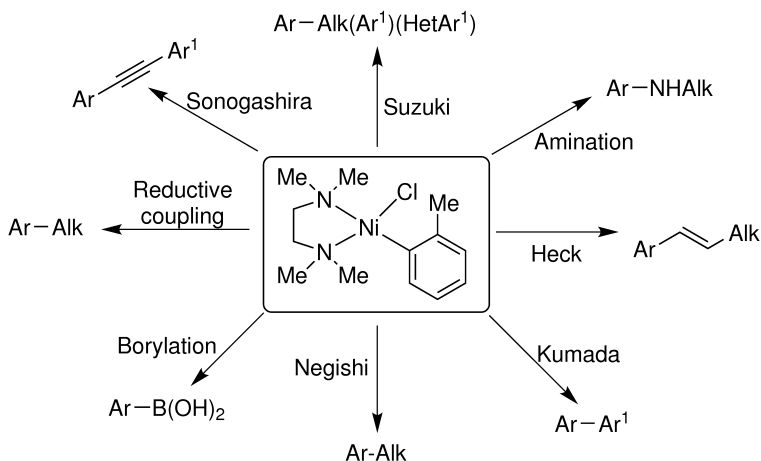


500mg
2g
10g

Technical Notes:

1. Air-Stable Nickel precatalyst for cross-coupling
2. Precatalyst allowing various ligands to be used (mono- and bidentate phosphines, diimines and NHCs)

NICKEL (Compounds)



Tech. Note (1,2)
Ref. (1,2)

References:

1. ACS Catal., **2015**, 5, 3120
2. Org. Lett., **2015**, 17, 2166

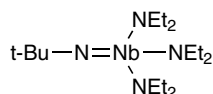
NIOBIUM (Compounds)

41-0450 (t-Butylimido)tris(diethylamino)niobium(V), min. 98% (210363-27-2)

NEW

HAZ

C₁₆H₃₈N₆Nb; FW: 380.41; yellow to brown orange, low melting solid
air sensitive, moisture sensitive



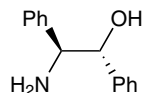
1g
5g

NITROGEN (Compounds)

07-0040 (1R,2S)-2-Amino-1,2-diphenylethanol, min. 98% (23190-16-1)

NEW

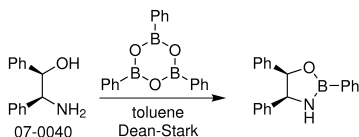
C₁₄H₁₅NO; FW: 213.28; white to light-yellow powdr.
Note: Sold in collaboration with Daicel for research purposes only.



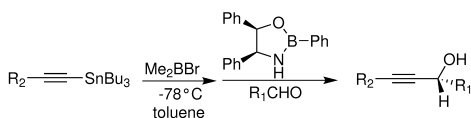
5g
25g

Technical Notes:

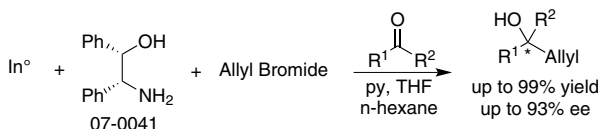
1. Ligand used to make chiral oxaborolidines for the enantioselective alkynylation of aldehydes
2. Ligand used in organoindium reagents for asymmetric Barbier-type allylations
3. Ligand used in organoindium reagents for asymmetric Barbier-type propargylations



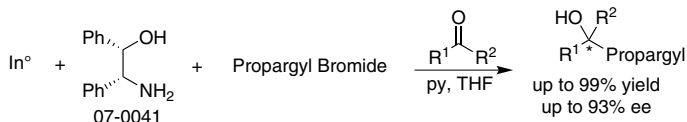
Tech. Note (1)
Ref. (1)



NITROGEN (Compounds)



Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)

References:

1. *J. Am. Chem. Soc.*, **1994**, 116, 3151
2. *J. Org. Chem.*, **2010**, 75, 642
3. *J. Org. Chem.*, **2012**, 77, 889

07-0041 (1*S*,2*R*)-2-Amino-1,2-diphenylethanol, min. 98% (23364-44-5)

5g

NEW

C₁₆H₁₅NO; FW: 213.28; white to light-yellow powdr.

25g

Note: Sold in collaboration with Daicel for research purposes only.

Technical Note:

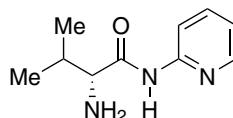
1. See 07-0040 (page 59)

07-0519 (2*R*)-2-Amino-3-methyl-N-2-pyridinylbutanamide, min. 98% (1568043-19-5)

NEW

C₁₀H₁₅N₃O; FW: 193.25; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

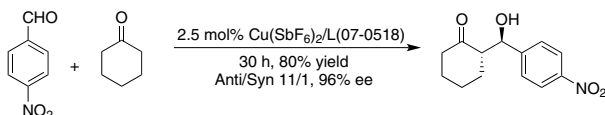


100mg

500mg

Technical Note:

1. Ligand for the copper-catalyzed asymmetric aldol reaction



Tech. Note (1)
Ref. (1)

References:

1. *Chem. Commun.*, **2011**, 47, 224

07-0518 (2*S*)-2-Amino-3-methyl-N-2-pyridinylbutanamide, min. 98% (167261-43-0)

NEW

C₁₀H₁₅N₃O; FW: 193.25; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

100mg

500mg

Technical Note:

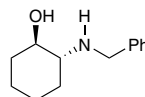
1. See 07-0519 (page 60)

07-0637 (1*R*,2*R*)-2-Benzylamino-1-cyclohexanol, min. 98% (141553-09-5)

NEW

C₁₃H₁₉NO; FW: 205.30; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.



500mg

2g

07-0638 (1*S*,2*S*)-2-Benzylamino-1-cyclohexanol, min. 98% (322407-34-1)

NEW

C₁₃H₁₉NO; FW: 205.30; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

500mg

2g

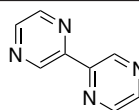
07-0750 2,2'-Bipyrazine, 95% (10199-00-5)

NEW

C₈H₆N₄; FW: 158.16; light-brown solid

air sensitive

Note: Ligand for photocatalyst synthesis.



250mg

1g

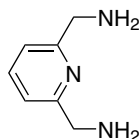
NITROGEN (Compounds)

07-0650

NEW

2,6-Bis(aminomethyl)pyridine, min. 85% (34984-16-2)

C₇H₁₁N₃; FW: 137.18; low melting yellow solid
air sensitive



1g
5g

07-0390

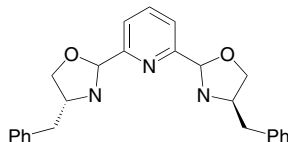
NEW

2,6-Bis[(4R)-benzyl-2-oxazolin-2-yl]

pyridine, min. 98% (365215-38-9)

C₂₅H₂₃N₃O₂; FW: 397.47; white to light-yellow powdr.

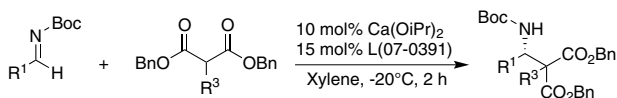
Note: Sold in collaboration with Daicel for research purposes only.



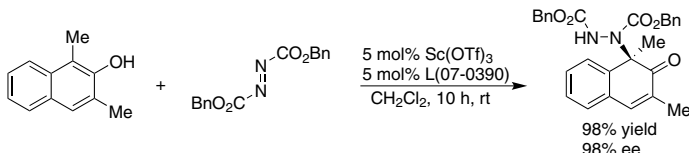
25mg
100mg

Technical Notes:

- Ligand for the Calcium-catalyzed asymmetric Mannich reaction of malonates with imines
- Ligand for the Scandium-catalyzed asymmetric dearomatization of 2-naphthols by electrophilic amination



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

- J. Org. Chem., **2010**, 75, 963
- Angew. Chem. Int. Ed., **2015**, 54, 2356

07-0391

NEW

2,6-Bis[(4S)-benzyl-2-oxazolin-2-yl]pyridine, min. 98% (151670-69-8)

C₂₅H₂₃N₃O₂; FW: 397.47; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

25mg
100mg

Technical Note:

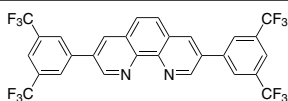
- See 07-0390 (page 61)

07-0481

NEW

3,8-Bis[3,5-bis(trifluoromethyl)phenyl]-1,10-phenanthroline
(1228032-35-6)

C₂₈H₁₂F₁₂N₂; off-white powdr.



100mg
500mg

07-0273

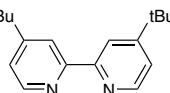
NEW

4,4'-Bis(di-t-butyl)-2,2'-bipyridine, 97% DTBBPY

(72914-19-3)

C₁₈H₂₄N₂; FW: 268.40; white xtl.

hygroscopic

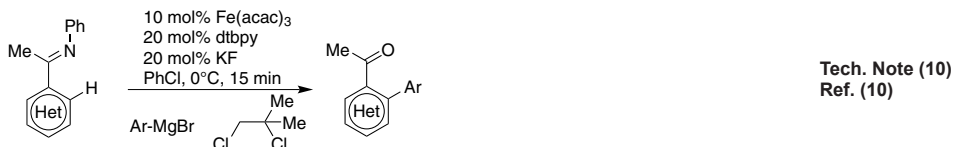
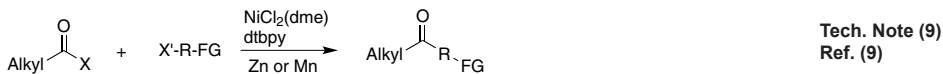
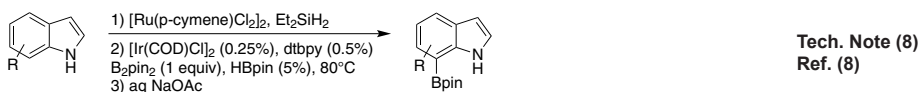
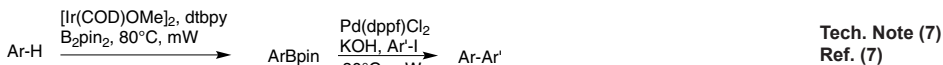
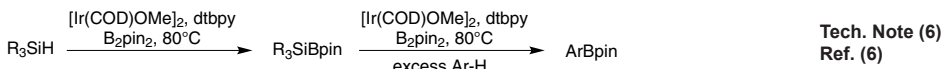
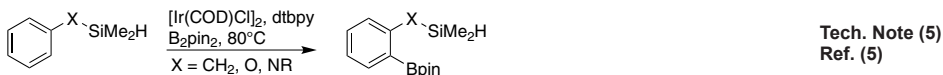
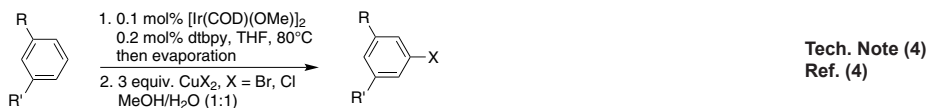
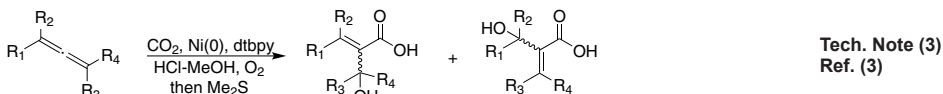
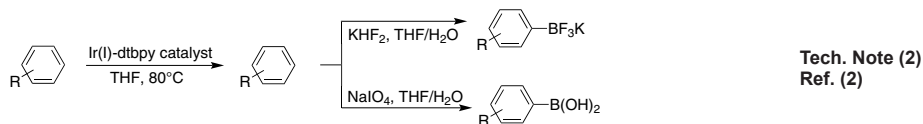
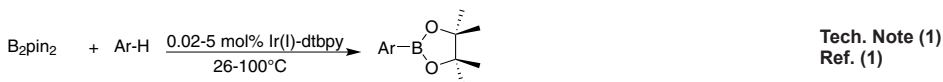


1g
5g

Technical Notes:

- Ligand for the iridium-catalyzed borylation of arenes
- Ligand for the iridium-catalyzed synthesis of arylboronic acids and aryl trifluoroborates
- Ligand for the nickel-catalyzed hydroxycarboxylation of 1,2-dienes by reaction carbon dioxide and oxygen
- Ligand for the iridium-catalyzed meta borylation followed by halogenation of 1,3-disubstituted arenes
- Ligand for the iridium-catalyzed silyl-directed ortho-borylation of arenes
- Ligand for the iridium-catalyzed silane borylation followed by aryl borylation
- Ligand for the iridium-catalyzed microwave-accelerated borylation of aromatic C-H bonds
- Ligand for the iridium-catalyzed silyl-directed borylation of indoles
- Ligand for the nickel-catalyzed synthesis of functionalized dialkyl ketones from carboxylic acids and alkyl halides
- Ligand for the iron-catalyzed arylation of heterocycles

NITROGEN (Compounds)



References:

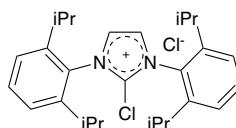
1. *J. Am. Chem. Soc.*, **2002**, 124, 390
2. *Org. Lett.*, **2007**, 9, 757
3. *Org. Lett.*, **2007**, 9, 1251
4. *J. Am. Chem. Soc.*, **2007**, 129, 15434
5. *J. Am. Chem. Soc.*, **2008**, 130, 7534
6. *Organometallics*, **2008**, 27, 6013
7. *Org. Lett.*, **2009**, 11, 3586
8. *J. Am. Chem. Soc.*, **2010**, 132, 4068
9. *Org. Lett.*, **2012**, 14, 1476
10. *Org. Lett.*, **2014**, 16, 868

NITROGEN (Compounds)

07-0620

NEW

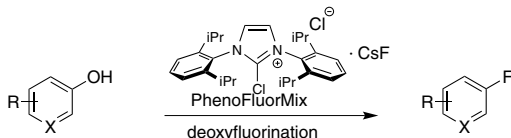
1,3-Bis(2,6-di-*i*-propylphenyl)-2-chloroimidazolium chloride, 98+% (1228185-09-8)
 $C_{27}H_{36}Cl_2N_2$; FW: 459.49; colorless solid
hygroscopic



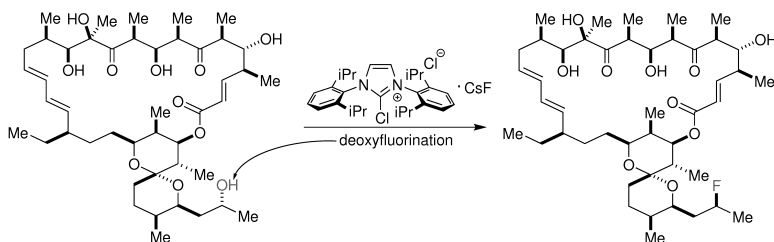
250mg
1g

Technical Notes:

- Used with cesium fluoride for deoxyfluorination of phenols, heterocyclic alcohols and structurally complex alcohols
- Component of PhenoFluorMix (07-4055)



**Tech. Note (1)
Ref. (2)**



**Tech. Note (1)
Ref. (2)**

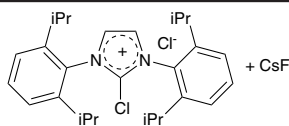
References:

- J. Am. Chem. Soc.*, **2011**, 133, 11482
- J. Am. Chem. Soc.*, **2013**, 135, 2470
- Org. Process Res. Dev.*, **2014**, 18, 1041
- Org. Lett.*, **2015**, 17, 544

07-4055

NEW

1,3-Bis(2,6-di-*i*-propylphenyl)-2-chloroimidazolium chloride/cesium fluoride admixture (1.0/6.7 molar ratio or 1/2.2 weight ratio) PhenoFluor®Mix (1228185-09-8)
 $[C_{27}H_{36}Cl_2N_2][CsF]_{6.7}$; off-white solid
hygroscopic
 Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard4

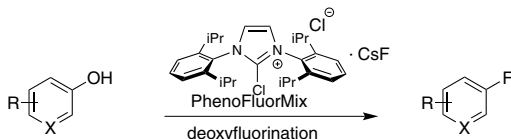


250mg
1g

Note: 31.2 wt% ligand (07-0620), 8 wt% CsF (93-5519)

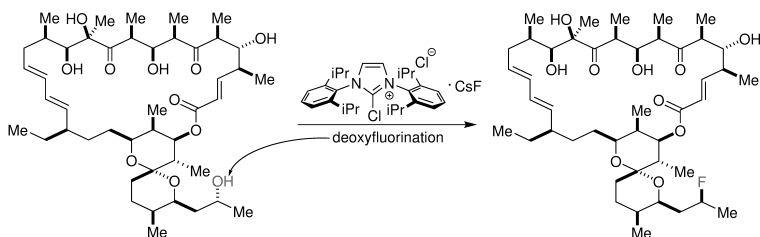
Technical Note:

- PhenoFluorMix is a bench-stable mixture of 07-0620 and cesium fluoride used for the deoxyfluorination of phenols, heterocyclic alcohols and structurally complex alcohols



**Tech. Note (1)
Ref. (1,3,4)**

NITROGEN (Compounds)



Tech. Note (1)
Ref. (2)

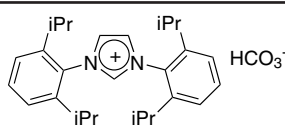
References:

1. *J. Am. Chem. Soc.*, **2011**, 133, 11482
2. *J. Am. Chem. Soc.*, **2013**, 135, 2470
3. *Org. Process Res. Dev.*, **2014**, 18, 1041
4. *Org. Lett.*, **2015**, 17, 544

07-0484

NEW

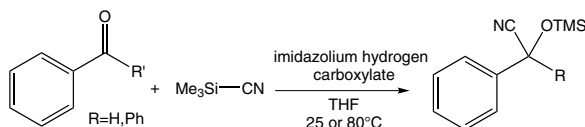
1,3-Bis(2,6-di-*i*-propylphenyl)imidazolium bicarbonate, min. 97% IPrH.HCO₃
(1663476-15-0)
[C₂₇H₃₇N₂]⁺HCO₃⁻; FW: 450.61; white to off-white powdr.
hygroscopic



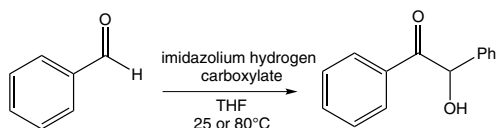
500mg
2g

Technical Notes:

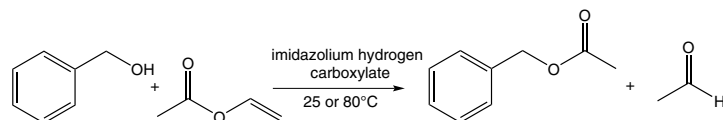
1. Catalyst used for the cyanosilylation of benzaldehyde or benzophenone.
2. Catalyst used in the benzoin condensation reaction.
3. Catalyst used to effect the transesterification between benzyl alcohol and vinyl acetate.



Tech. Note (1)
Ref. (1)



Tech. Note (2)



Tech. Note (3)

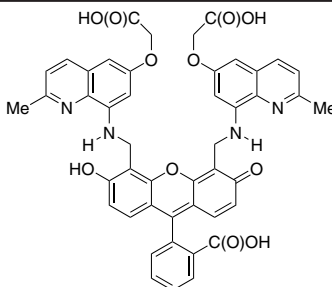
References:

1. *J. Org. Chem.*, **2012**, 77, 10135
2. *Catal. Sci. Technol.*, **2014**, 4, 2466

07-0287

NEW

2-{4,5-Bis[6-(2-ethoxy-2-oxohydroxy)-2-methylquinolin-8-ylamino]methyl}-6-hydroxy-3-oxo-3H-xanthen-9-yl}benzoic acid FL2A
(1239877-07-6)
C₄₆H₃₆N₄O₁₁; FW: 848.85; dark-red solid
Note: Nitric Oxide Sensor (Extracellular) Kit ("NO-ON") (FL2) component.

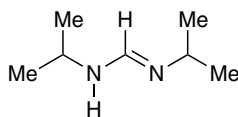


0.5mg

NITROGEN (Compounds)

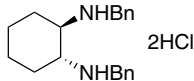
07-2203 **1,4-Bis(2-isocyanopropyl)piperazine (SnatchCat Metal Scavenger) (51641-96-4)**
See page 48

07-0240 **N,N'-Bis(1-methylethyl)methanimidamide, min. 98% (44843-38-1)**
NEW
 $C_7H_{16}N_2$; FW: 128.22; off-white powdr.



1g
5g
25g

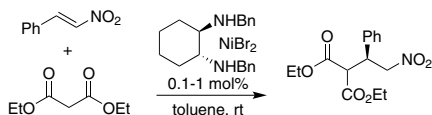
07-4073 **(1R,2R)-N,N'-Bis(phenylmethyl)-1,2-cyclohexanedi-amine dihydrochloride, min. 98% (212611-88-6)**
NEW
 $C_{20}H_{26}N_2 \cdot 2HCl$; FW: 367.36; white to light-yellow powdr.
Note: Sold in collaboration with Daicel for research purposes only.



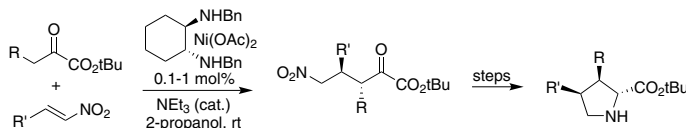
1g
5g

Technical Notes:

- Ligand for Ni-catalyzed enantioselective Michael additions of 1,3-dicarbonyl compounds to nitroalkenes
- Ligand for Ni-catalyzed enantioselective conjugate addition of α -ketoesters to nitroalkenes



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

- J. Am. Chem. Soc.*, **2007**, 129, 11583
- J. Am. Chem. Soc.*, **2010**, 132, 4036

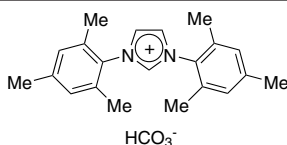
07-4074 **(1S,2S)-N,N'-Bis(phenylmethyl)-1,2-cyclohexanediamine dihydrochloride, min. 98%**
NEW
 $C_{20}H_{26}N_2 \cdot 2HCl$; FW: 367.36; white to light-yellow powdr.
Note: Sold in collaboration with Daicel for research purposes only.

1g
5g

Technical Note:

- See 07-4073 (page 65)

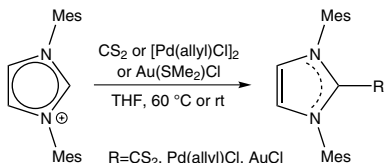
07-4033 **1,3-Bis(2,4,6-trimethylphenyl)imidazolium bicarbonate, min. 97% IMesH.HCO₃ (1372124-93-0)**
NEW
 $[C_{21}H_{25}N_2]^+HCO_3^-$; FW: 366.45; white to yellow-orange powdr.
moisture sensitive



500mg
2g

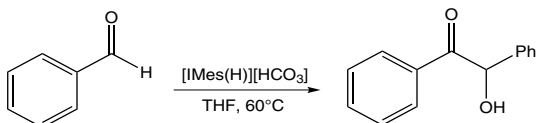
Technical Notes:

- This compound is used as a source of NHC's and can be transferred to transition metals.
- This catalyst is used in the benzoin condensation reaction.



Tech. Note (1)
Ref. (1)

NITROGEN (Compounds)



Tech. Note (2)
Ref. (1, 2)

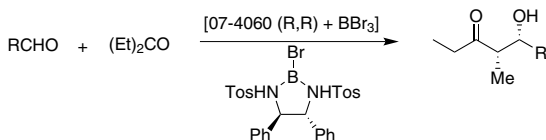
References:

1. *J. Am. Chem. Soc.*, **2012**, 134, 6776
2. *J. Org. Chem.*, **2012**, 77, 10135

07-1280 NEW	2-(2,4-Difluorophenyl)-5-methylpyridine, 95% (583052-21-5) $C_{12}H_9F_2N$; FW: 205.20; white solid <i>air sensitive</i> Note: Ligand for photocatalyst synthesis.	 <chem>Cc1cc(C(F)=C(F)c2ccccc2)ncn1</chem>	500mg 2g
07-4040 NEW	2-(2,4-Difluorophenyl)-5-(trifluoromethyl)pyridine, 98% dF(CF₃)ppy (387827-64-7) $C_{12}H_6F_5N$; FW: 259.18; off-white microxtl.; m.p. 59.0-62.1°	 <chem>Cc1cc(C(F)=C(F)c2cc(C(F)(F)F)cn2)ncn1</chem>	250mg 1g
07-0496 NEW	(2R,3S)-(-)-3,4-Dihydro-3-(i-propyl)-2-phenyl-2H-pyrimido[2,1-b]benzothiazole, min. 98% HyperBTM (1203507-02-1) $C_{19}H_{20}N_2S$; FW: 308.44; white powdr.	 <chem>CC(C)[C@H]1CN2C(=N1)SC3=CC=CC=C3N2C4=CC=CC=C4</chem>	100mg 500mg
07-1923 NEW HAZ	4,7-Dimethoxy-1,10-phenanthroline, 98% (92149-07-0) $C_{14}H_{10}N_2O_2$; FW: 238.24; white to off-white powdr.; m.p. 210-212°; d. 1.25 <i>air sensitive</i> Note: Ligand for photocatalyst synthesis.	 <chem>COC1=CC2=C(N1)N=CC=C2C3=CC(OC)=CC=N3</chem>	250mg 1g
07-0458 NEW	4,4'-Dimethyl-2,2'-bipyridine, 99% (1134-35-6) $C_{12}H_{12}N_2$; FW: 184.24; white to off-white powdr.	 <chem>Cc1cc(C)nc2cc(C)ncn12</chem>	1g 5g 25g
07-0510 NEW	1,3-Di-(4-pyridyl)propane, 98% (17252-51-6) $C_{13}H_{14}N_2$; FW: 198.26; light yellow xtl.	 <chem>C1=CC=CC=N1CCCCC2=CC=CC=N2</chem>	5g 25g
07-4060 NEW	(1R,2R)-N,N'-Di-p-tosyl-1,2-diphenyl-1,2-ethylenediamine, min. 98% (121758-19-8) $C_{28}H_{28}N_2O_4S_2$; FW: 520.67; white to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	 <chem>Cc1ccc(S(=O)(=O)N[C@H](Cc2ccccc2)[C@H](Cc3ccccc3)NS(=O)(=O)c4ccc(C)cc4)cc1</chem>	500mg 1g

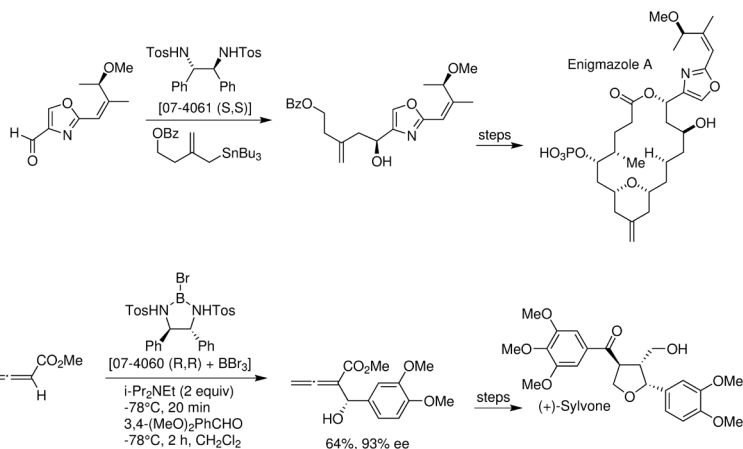
Technical Notes:

1. Chiral reagent used the natural product synthesis of the rice and corn weevil aggregation pheromone sitophilure
2. Chiral reagent used in the total synthesis of enigmazole A
3. Chiral reagent used in the enantioselective synthesis of Furan Lignan (+)-Sylvone



Tech. Note (1)
Ref. (1)

NITROGEN (Compounds)



Tech. Note (2)
Ref. (2)

Tech. Note (3)
Ref. (3)

References:

1. *J. Am. Chem. Soc.*, **1989**, 111, 5493
2. *J. Am. Chem. Soc.*, **2010**, 132, 10286
3. *J. Org. Chem.*, **2015**, 80, 10359

07-4061 (1S,2S)-N,N'-Di-p-tosyl-1,2-diphenyl-1,2-ethylenediamine, min. 98%
(170709-41-8)

NEW

C₂₈H₂₈N₂O₄S₂; FW: 520.67; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

500mg
1g

Technical Note:

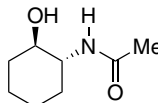
1. See 07-4060 (page 66)

07-0785 N-[(1R,2R)-2-Hydroxycyclohexyl]acetamide, min. 98%
(214348-95-5)

NEW

C₈H₁₅NO₂; FW: 157.21; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.



1g
5g

07-0786 N-[(1S,2S)-2-Hydroxycyclohexyl]acetamide, min. 98% (190848-36-3)

NEW

C₈H₁₅NO₂; FW: 157.21; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

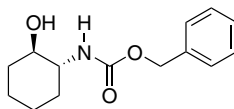
1g
5g

07-1005 [(1R,2R)-2-Hydroxycyclohexyl]carbamic Acid Phenylmethyl Ester, min. 98% (134108-76-2)

NEW

C₁₄H₁₉NO₃; FW: 249.31; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.



1g
5g

07-1006 [(1S,2S)-2-Hydroxycyclohexyl]carbamic Acid Phenylmethyl Ester, min. 98% (198422-64-9)

NEW

C₁₄H₁₉NO₃; FW: 249.31; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

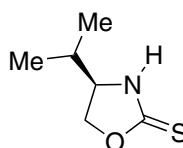
1g
5g

07-0615 (R)-4-Isopropyl-2-oxazolidinethione, min. 98%
(1217463-35-8)

NEW

C₆H₁₁NOS; FW: 145.22; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.



500mg
2g

07-0616 (S)-4-Isopropyl-2-oxazolidinethione, min. 98% (104499-08-3)

NEW

C₆H₁₁NOS; FW: 145.22; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

500mg
2g

NITROGEN (Compounds)

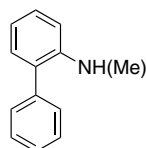
07-1158

NEW

2-(N-Methylamino)-1,1'-biphenyl, min. 95% (14925-09-8)

C₁₃H₁₃N; FW: 183.25; pale-yellow liq.

air sensitive



250mg

1g

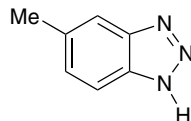
5g

07-1215

NEW

5-Methyl-1H-benzotriazole, 99% (136-85-6)

C₇H₇N₃; FW: 133.15; white to off-white solid



25g

100g

500g

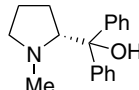
07-1170

NEW

(2R)-(-)-N-Methyl-α,α-diphenyl-2-pyrrolidinemethanol, min. 98% (144119-12-0)

C₁₈H₂₁NO; FW: 267.37; white to light-yellow powdr.; m.p. 68-71°

Note: Sold in collaboration with Daicel for research purposes only.

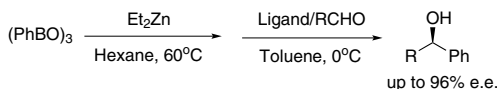


100mg

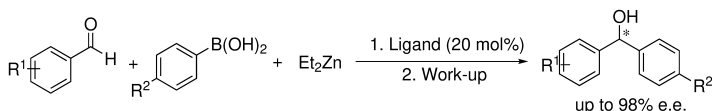
250mg

Technical Notes:

- Chiral amino alcohol assisted asymmetric, enantioselective, aryl transfer of triphenylboroxin to a set of aryl aldehydes in the presence of chiral amino alcohols derived from (S)-proline.
- Pyrrolidinylmethanol compound used for the zinc-catalyzed addition of arylboronic acids to aromatic aldehydes, proceeding in high yields and high enantioselectivities (up to 98% ee).



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

- Tetrahedron Asymmetry* **2005**, 16, 2299
- Tetrahedron Lett.*, **2005**, 46, 7827

07-1171

NEW

(2S)-(+)-N-Methyl-α,α-diphenyl-2-pyrrolidinemethanol, min. 98% (110529-22-1)

C₁₈H₂₁NO; FW: 267.37; white to pale-yellow powdr.; m.p. 66-69°

Note: Sold in collaboration with Daicel for research purposes only.

100mg

250mg

Technical Note:

- See 07-1170 (page 68)

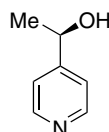
07-1160

NEW

(R)-(+)-α-Methyl-4-pyridinemethanol, min. 98% (27854-88-2)

C₇H₉NO; FW: 123.15; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

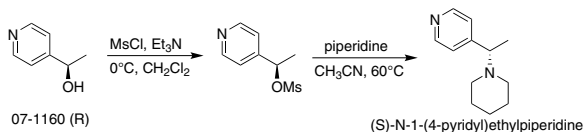


50mg

100mg

Technical Notes:

- Used for the synthesis of chiral 1-(4-pyridinyl)ethylamines
- Precursor for intermediates of highly stable chiral (A)6-B Supramolecular Copolymers

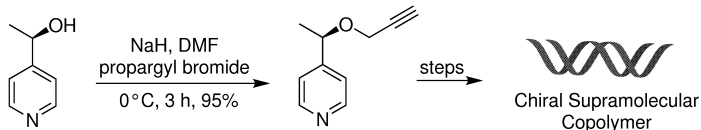


07-1160 (R)

(S)-N-1-(4-pyridyl)ethylpiperidine

Tech. Note (1)
Ref. (1)

NITROGEN (Compounds)



Tech. Note (2)
Ref. (2)

References:

1. *J. Org. Chem.*, **2004**, 69, 6781
2. *J. Am. Chem. Soc.*, **2011**, 133, 11124

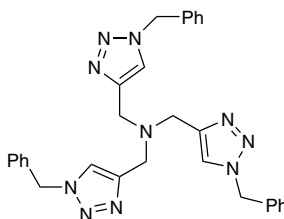
07-1161 NEW	(S)-(-)-α-Methyl-4-pyridinemethanol, min. 98% (54656-96-1) C_7H_9NO ; FW: 123.15; white to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg 100mg
Technical Note: 1. See 07-1160 (page 68)		
96-0397	Nitric Oxide Sensor (Extracellular) Kit ("NO-ON") (FL2A) (Cell-impermeable NO fluorescent probe) See page 44	
07-1780 NEW	2-Phenylpyridine, 95% (1008-89-5) $C_{11}H_9N$; FW: 155.20; amber liquid; b.p. 268-270°; f.p. 230°; d. 1.086 <i>air sensitive</i> Note: Ligand for photocatalyst synthesis.	1g
07-3333 NEW	2-(Pyridine-2-yl)propan-2-ol, min. 95% pycal (37988-38-8) $(C_9H_9N)C(CH_3)_2(OH)$; FW: 137.18; white xtl.	100mg 500mg 2g
07-1895 NEW	(R)-(-)-2-Pyrrolidinemethanol, 99% (D-Prolinol) (68832-13-3) $C_5H_{11}NO$; FW: 101.15; light-yellow, viscous liq.; b.p. 74-76° (2mm); d. 1.025 <i>air sensitive</i>	1g 5g 25g
07-2625 NEW	2-[4-(Trifluoromethyl)phenyl]pyridine, 95% (203065-88-7) $C_{12}H_8F_3N$; FW: 223.19; white to yellow solid <i>air sensitive</i> Note: Ligand for photocatalyst synthesis.	1g
07-1840 NEW	2-[(Trifluoromethyl)thio]-1,1-dioxide-1,2-benzisothiazol-3(2H)-one, 97% (1647073-46-8) $C_8H_4F_3NO_3S_2$; FW: 283.25; white solid <i>air sensitive, moisture sensitive</i>	250mg 1g
07-2758 NEW	4,4',4''-Trimethyl-2,2':6',2''-terpyridine, 98% (33354-75-5) $C_{18}H_{17}N_3$; FW: 275.35; white to off-white powdr.	500mg 2g

NITROGEN (Compounds)

07-3215

NEW

Tris[(1-benzyl-1H-1,2,3-triazol-4-yl)methyl]amine, 97% TBTA (510758-28-8)
 $C_{30}H_{30}N_{10}$; FW: 530.63; white to off-white powdr.
 (store cold)



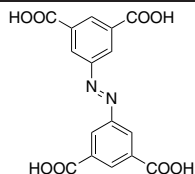
250mg
1g

OXYGEN (Compounds)

08-0125

NEW

3,3',5,5'-Azobenzene tetracarboxylic acid, TazbH₄, 97% (365549-33-3)
 $C_{16}H_{10}N_2O_8$; FW: 358.26; yellow-orange powdr.
 Note: Ligand for MOF Synthesis

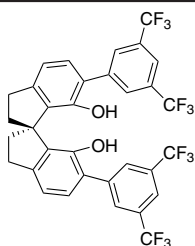


1g
5g

08-0163

NEW

(1R)-6,6'-Bis[3,5-bis(trifluoromethyl)phenyl]-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, min. 98% (1286189-16-9)
 $C_{33}H_{20}F_{12}O_2$; FW: 676.49; white to light-yellow powdr.
 Note: Sold in collaboration with Daicel for research purposes only.



25mg
100mg

08-0164

NEW

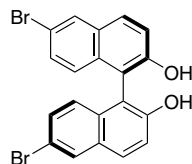
(1S)-6,6'-Bis[3,5-bis(trifluoromethyl)phenyl]-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, min. 98% (1258327-01-3)
 $C_{33}H_{20}F_{12}O_2$; FW: 676.49; white to light-yellow powdr.
 Note: Sold in collaboration with Daicel for research purposes only.

25mg
100mg

08-0185

NEW

(R)-(-)-6,6'-Dibromo-1,1'-bi-2-naphthol, 98% (99% ee) (65283-60-5)
 $C_{20}H_{12}Br_2O_2$; FW: 444.12; white to light-yellow powdr.
 Note: Sold in collaboration with Daicel for research purposes only.



500mg
2g

08-0186

NEW

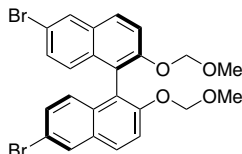
(S)-(+)-6,6'-Dibromo-1,1'-bi-2-naphthol, 98% (99% ee) (80655-81-8)
 $C_{20}H_{12}Br_2O_2$; FW: 444.12; white to light-yellow solid
 Note: Sold in collaboration with Daicel for research purposes only.

500mg
2g

08-0152

NEW

(R)-(+)-6,6'-Dibromo-2,2'-bis(methoxymethoxy)-1,1'-binaphthalene, min. 98% (99% ee) (179866-74-1)
 $C_{24}H_{20}Br_2O_4$; FW: 532.22; white to light-yellow powdr.; m.p. 133°
 Note: Sold in collaboration with Daicel for research purposes only.



100mg
500mg

08-0153

NEW

(S)-(-)-6,6'-Dibromo-2,2'-bis(methoxymethoxy)-1,1'-binaphthalene, min. 98% (99% ee) (211560-97-3)
 $C_{24}H_{20}Br_2O_4$; FW: 532.22; white to light-yellow powdr.; m.p. 133°
 Note: Sold in collaboration with Daicel for research purposes only.

100mg
500mg

OXYGEN (Compounds)

08-0215

NEW

1,4-Di-*t*-butyl-2,5-bis(2-methoxyethoxy)benzene, 99+% Redox shuttle ANL-RS2 (1350770-63-6)

$C_{20}H_{34}O_4$; FW: 338.48; white to off-white powdr.; m.p. 69-70°

air sensitive, moisture sensitive

Note: U.S. Patent: 8,609,287. European Patent App.: 11787270.5.

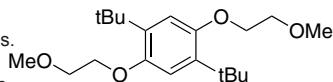
Chinese Patent App.: 11/80014192.6

1g

5g

Redox Shuttles for Lithium Ion Batteries

1. Provides a long term intrinsic overcharge protection of lithium-ion batteries.
2. Maintains the safe operation of lithium-ion batteries.
3. Highly-soluble in conventional non-aqueous, carbonate based electrolytes.
4. Increases battery long-term stability and oxidation potential.



Electrochemical Properties:

1. ANL-RS2 (abbreviated DBBB) redox shuttle, compared to other dimethoxybenzene-based shuttles, has demonstrated improved solubility in carbonate-based electrolytes. DBBB displays a reversible redox potential at 3.9 V [1]
2. In comparison to a variety of quinoxaline-based species, DBBB exhibits reversible single electron transfer at 4 V vs. Li/Li+. Quinoxaline and its derivatives demonstrate two redox events between 4-3 V vs. Li/Li+ [2]
3. DBBB enriched electrolyte was demonstrated as an effective protection against overcharge abuse in 18650 format LiFePO4 based lithium ion batteries [3]
4. Due to excellent solubility in carbonate-based electrolytes and improved electrolyte conductivity, DBBB is compatible with modest battery technologies [4-5].

References:

1. *Energy Environ. Sci.*, **2012**, 5, 8204.
2. *Adv. Energy Mater.*, **2012**, 2, 1390
3. *J. Power Sources*, **2014**, 247, 1011
4. *J. Electrochem. Soc.*, **2014**, 161, A1905
5. *J. Electrochem. Soc.*, **2016**, 163, A1.

08-1220

NEW

2,5-Dihydroxyterephthalic acid, 98% H₂DOBDC (610-92-4)

$C_8H_2(OH)_2(COOH)_2$; FW: 198.13; white powdr.

Note: Ligand for MOF Synthesis

1g

5g

25g

08-0220

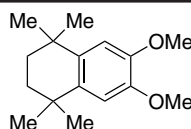
NEW

6,7-Dimethoxy-1,1,4,4-tetramethyl-1,2,3,4-tetrahydronaphthalene, 99+% Redox shuttle ANL-RS21 (22825-00-9)

$C_{16}H_{24}O_2$; FW: 248.36; off-white solid

air sensitive, moisture sensitive

Note: U.S. Patent: 13/457,239.



1g

5g

Redox Shuttles for Lithium Ion Batteries

1. Provides a long term intrinsic overcharge protection of lithium-ion batteries.
2. Maintains the safe operation of lithium-ion batteries.
3. Highly-soluble in conventional non-aqueous, carbonate based electrolytes.
4. Increases battery long-term stability and oxidation potential.

Electrochemical Properties:

1. ANL-RS21 5 mM exhibits a redox potential of about 4.05V, in electrolytes (1.2 M LiPF₆ in 3:7 wt/wt mixtures of EC/EMC). [1]
2. The redox shuttle in aprotic solvents can be used from -30° C to 70° C and are stable in the electrochemical window in which the cell electrodes and redox shuttle operates. ANL-RS21 undergoes reversible electrochemical oxidation to form stable cation-radical salts. [2]

References:

1. *US* **2013**, 0288137, A1
2. *Org. Lett.*, **2009**, 11, 2253

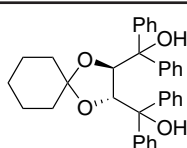
08-0611

NEW

(2R,3R)-1,4-Dioxaspiro[4.5]decane-2,3-diylbis(diphenylmethanol), min. 98% (114026-76-5)

$C_{34}H_{34}O_4$; FW: 506.63; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.



500mg

2g

08-0612

NEW

(2S,3S)-1,4-Dioxaspiro[4.5]decane-2,3-diylbis(diphenylmethanol), min. 98% (123287-35-4)

$C_{34}H_{34}O_4$; FW: 506.63; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

500mg

2g

OXYGEN (Compounds)

08-1235

NEW

2,6-Naphthalenedicarboxylic acid, min. 98% (1141-38-4)

$C_{16}H_8(COOH)_2$; FW: 216.19; white powdr.; m.p. >300°

Note: Ligand for MOF synthesis.

5g

25g

08-2065

NEW

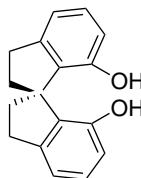
(R)-2,2',3,3'-Tetrahydro-1,1'-spirobi[indene]-7,7'-diol, 99% (223259-62-9)

$C_{17}H_{16}O_2$; FW: 252.31; white solid

Note: Sold in collaboration with Daicel for research purposes only.

250mg

1g



PALLADIUM (Elemental Forms)

28-0015

NEW

Nickel/palladium alloy nanoparticle on graphene (G-Ni₃₃Pd₆₇)

black powdr.

Note: U.S. Patent Application

14/667,859.

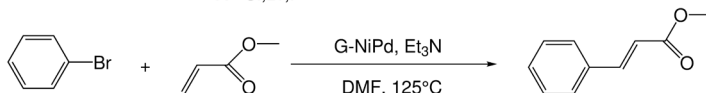
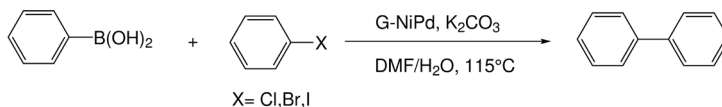
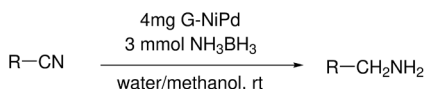
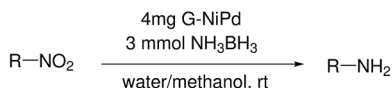
25mg

100mg



Technical Note:

1. NiPd NPs are useful catalysts for the tandem dehydrogenation of ammoniaborane and hydrogenation of R-NO₂ or R-CN to R-NH₂. NiPd nanoparticles also catalyze Suzuki-Miyaura and Heck cross-coupling reactions. The product is synthesized via the borane reduction of nickel and palladium salts in oleylamine, followed by dispersing the resulting mixture of Ni/Pd nanoparticles on graphene. The catalyst is 100% recyclable and shows no drop in catalytic activity after one month, when stored in air/argon at ambient temperatures.



References:

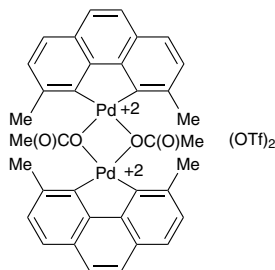
1. *Nano Research*, **2013**, 6, 10.
2. *ACS Catal.*, **2014**, 4, 1777.

PALLADIUM (Compounds)

46-0970

NEW

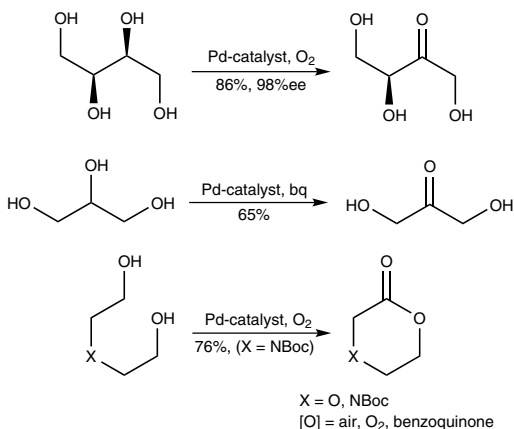
Acetato(2,9-dimethyl-1,10-phenanthroline)palladium(II) dimer bis(trifluoromethanesulfonate), 99% (959698-19-2)
 $C_{34}H_{30}F_6N_4O_{10}Pd_2S_2$; FW: 1045.59; dark orange powdr.



100mg
500mg

Technical Note:

- This dimeric palladium complex is used in the chemoselective oxidation of polyols.



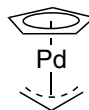
References:

- J. Am. Chem. Soc.*, **2013**, 135, 7593

46-0065

NEW

Allyl(cyclopentadienyl)palladium(II), 98% (1271-03-0)
 $C_8H_{10}Pd$; red solid
air sensitive, (store cold)



100mg
500mg
2g

Technical Notes:

- Volatile palladium catalyst with numerous uses in CVD and MOCVD applications.

References:

- Chem. Eur. J.*, **2012**, 19, 13652
 - Catalysis Letters*, **2012**, 142, 313
 - Chemistry of Materials*, **2009**, 21, 2360
- Starting material for the in situ generation of active palladium catalysts.

References:

- Syn. Lett.*, **2014**, 25, 2488
- Org. Lett.*, **2013**, 15, 5932
- Angew. Chem. Int. Ed.*, **2013**, 52, 4466

46-0700

NEW

Bis(acetonitrile)palladium(II) p-toluenesulfonate, 98% (114757-66-3)
 $C_{18}H_{20}N_2O_6S_2Pd$; FW: 530.91; yellow powdr.
air sensitive, (store cold)

50mg
250mg

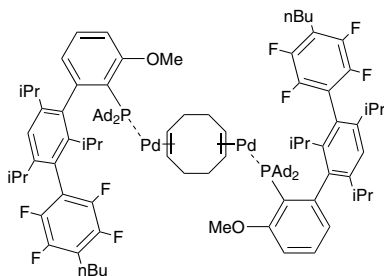
PALLADIUM (Compounds)

46-0241

NEW

Bis{[2-(Diadamantylphosphino)-3-methoxy-2',4',6'-tri-*i*-propyl-3'-(2,3,5,6-tetrafluoro-4-butyphenyl)-1,1'-biphenyl] palladium(0)}1,5-cyclooctadiene, [AlPhos Palladium complex] (1805783-51-0)

C₁₁₂H₁₄₆F₈O₂P₂D₂; FW: 1951.13; yellow-green solid
Note: Patents: US 6,395,916, US 6,307,087

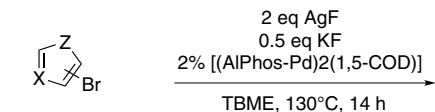


50mg

250mg

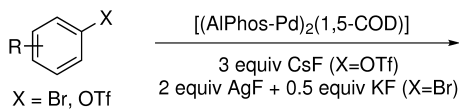
Technical Notes:

- Ligand for the Palladium-Catalyzed Fluorination of Five-Membered Heteroaryl Bromides.
- Ligand for the Palladium-Catalyzed Fluorination of Aryl Triflates and Bromides.



Z = S, O, NR
X = N, CH

Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

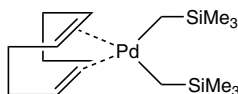
References:

- Organometallics*, **2015**, 34, 4775
- J. Am. Chem. Soc.*, **2015**, 137, 13433

46-0308

NEW

Bis(trimethylsilyl)methyl[(1,5-cyclooctadiene)palladium(II)], 98% (225931-80-6)
C₁₆H₃₄PdSi₂; FW: 389.03; gray powdr.
air sensitive, (store cold)



250mg

1g

96-5512

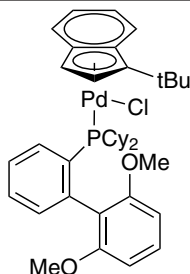
Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methyl-amino-1,1'-biphenyl-2-yl)- Palladacycles Gen. 4)
See page 37

46-0435

NEW

Chloro(1-*t*-butylindenyl)[2-(dicyclohexylphosphino)-2',6'-dimethoxy-1,1'-biphenyl] palladium(II) (1779569-07-1)

C₃₉H₅₂ClO₂PPd; FW: 723.06; orange powdr.
Note: For research and development only. Not for use in humans. Patents 62/061,319, US 6,395,916, US 6,307,087.



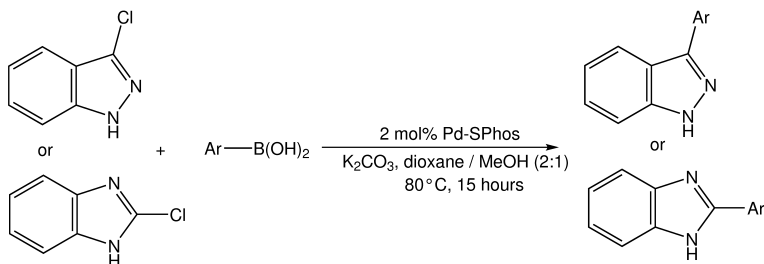
100mg

500mg

Technical Note:

- Catalyst used in the Suzuki cross-coupling of 3-chloroindazole or 3-chlorobenzimidazole with arylboronic acids.

PALLADIUM (Compounds)



Tech. Note (1)

References:

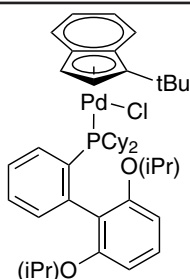
1. *ACS Catal.*, **2015**, 5, 3680.

46-0440

NEW

Chloro(1-*t*-butylindenyl)[2-(dicyclohexylphosphino)-2',6'-di-*i*-propoxy-1,1'-biphenyl] palladium(II) (1779569-08-2)

C₄₃H₅₈ClO₂PPd; FW: 779.77; orange powdr.
Note: For research and development only. Not for use in humans. Patents 62/061,319. US 6,395,916, US 6,307,087.

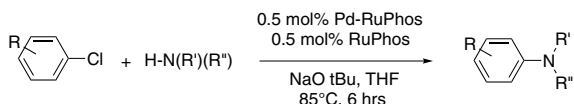


100mg

500mg

Technical Note:

1. Catalyst used in the Buchwald-Hartwig cross-coupling of substituted aryl chlorides with secondary amines.



Tech. Note (1)

References:

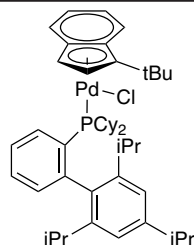
1. *ACS Catal.*, **2015**, 5, 3680.

46-0437

NEW

Chloro(1-*t*-butylindenyl)[2-(dicyclohexylphosphino)-2',4',6'-tri-*i*-propyl-1,1'-biphenyl]palladium(II) (1779569-06-0)

C₄₆H₆₄ClPPd; FW: 789.85; orange powdr.
Note: For research and development only. Not for use in humans. Patents 62/061,319. US 6,395,916, US 6,307,087.

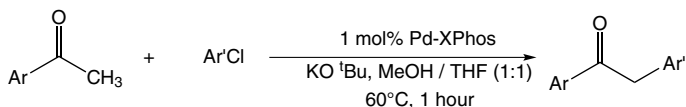


100mg

500mg

Technical Notes:

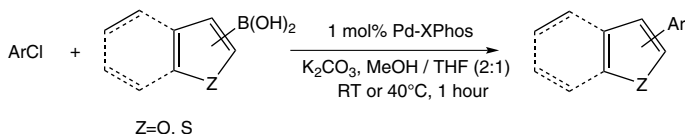
1. Catalyst used in the α -arylation of ketones.
2. Catalyst used in the Suzuki cross-coupling of aryl chlorides with boronic acid-substituted benzofurans.



Tech. Note (1)

Ref. (1)

PALLADIUM (Compounds)



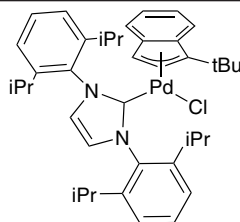
Tech. Note (2)
Ref. (1)

References:

1. *ACS Catal.*, **2015**, 5, 3680.

46-0815 **Chloro(1-t-butylindenyl)[1,3-bis(2,6-di-i-propylphenyl)imidazol-2-yl]palladium(II), 98%**
 $C_{40}H_{41}ClN_2Pd$; FW: 691.61; orange powdr.

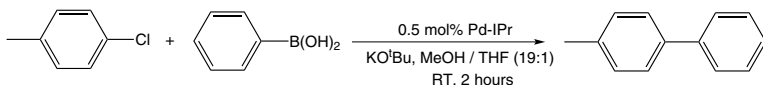
NEW



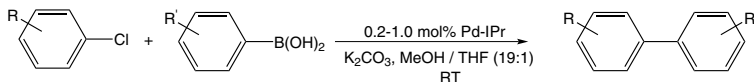
100mg
500mg

Technical Note:

1. Catalyst used in the Suzuki cross-coupling of aryl halides and aryl boronic acids.



Tech. Note (1)

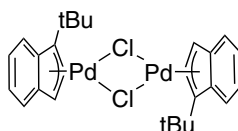


References:

1. *ACS Catal.*, **2015**, 5, 3680.

46-0868 **Chloro(1-t-butylindenyl)palladium(II) dimer, 98% (1779569-01-5)**
 $C_{26}H_{30}Cl_2Pd_2$; FW: 626.26; brown powdr.

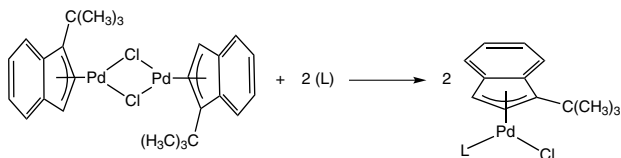
NEW



100mg
500mg

Technical Note:

1. Starting material used to prepare monomeric chloro(t-butylindenyl)(ligand)palladium complexes.



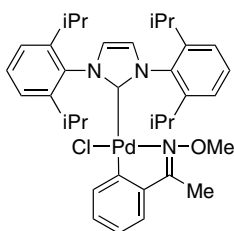
Tech. Note (1)
Ref. (1)

References:

1. *ACS Catal.*, **2015**, 5, 3680

46-1050 **Chloro[2-[1-(N-methoxyiminoethyl)phenyl]{[1,3-bis(2,6-di-i-propylphenyl)imidazole-2-ylidene]palladium(II) (1511859-41-8)**
 $C_{36}H_{46}ClN_3OPd$; FW: 678.64; pale yellow powdr.

NEW

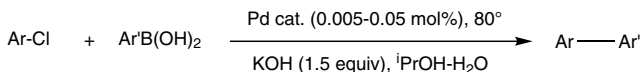


50mg
250mg

PALLADIUM (Compounds)

Technical Note:

- Extremely active palladium catalyst for Suzuki-Miyaura coupling of aryl chlorides.



Tech. Note (1)
Ref. (1)

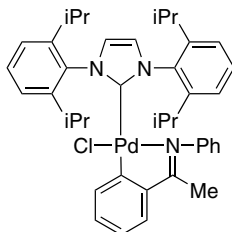
References:

- Tetrahedron Lett.*, **2014**, 55, 3278

46-1058

NEW

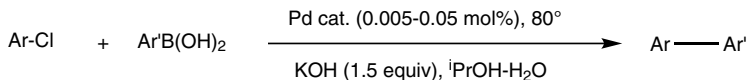
Chloro{2-[[1-(N-phenyl)iminoethyl]phenyl][1,3-bis(2,6-di-*i*-propylphenyl)imidazole-2-ylidene}palladium(II) (1905460-13-0)
C₄₁H₄₈ClN₃Pd; FW: 724.71; pale yellow powdr.



50mg
250mg

Technical Note:

- Extremely active palladium catalyst for Suzuki-Miyaura coupling of aryl chlorides.



Tech. Note (1)
Ref. (1)

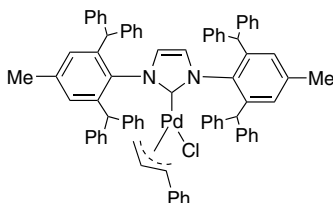
References:

- Tetrahedron Lett.*, **2014**, 55, 3278

46-0298

NEW

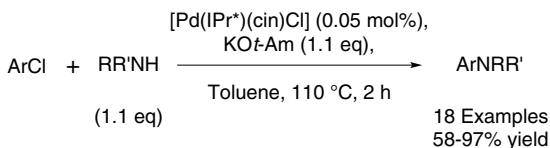
Chloro[(1,2,3- η)-1-phenyl-2-propen-1-yl]-[[1,3-bis[2,6-bis(diphenylmethyl)-4-methylphenyl]-2H-imidazol-2-ylidene]palladium(II), min. 97% (1380314-24-8)
C₇₈H₆₈ClN₂Pd; FW: 1172.24; yellow powdr.



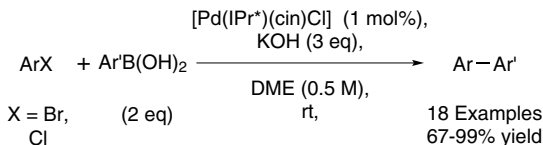
100mg
500mg

Technical Notes:

- Buchwald-Hartwig cross-coupling of aryl compounds.
- Preparation of tetra-ortho-substituted biaryls by Suzuki-Miyaura cross-coupling.
- Direct S-arylation of unactivated arylsulfonides.

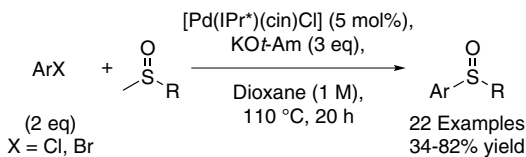


Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

PALLADIUM (Compounds)



Tech. Note (3)
Ref. (3)

R = phenyl, tolyl, naphthyl, anisyl.

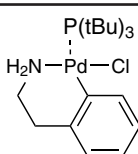
References:

- (a) For tertiary amines: *Adv. Synth. Catal.*, **2012**, 354, 1897, (b) For, secondary amines, *RSC Advances*, **2013**, 3, 3840
- Chem. Eur. J.*, **2012**, 18, 4517
- ACS Catal.*, **2013**, 3, 2190

46-0028

NEW

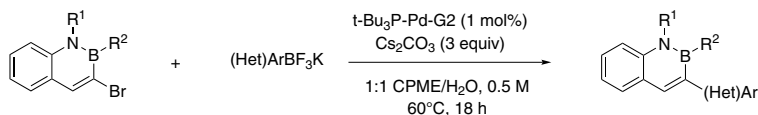
Chloro(tri-*t*-butylphosphine)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% (1375325-71-5)
C₂₄H₃₇ClNPPd; FW: 512.40; yellow powd.; m.p. 158-160°



250mg
1g
5g

Technical Note:

- Catalyst for the Suzuki Coupling of brominated 2,1-borazonaphthalenes and potassium organotrifluoroborates



Tech. Note (1)
Ref. (1)

>20 Brominated Azaborines

R¹ = H, alkyl

R² = alkyl, aryl, heteroaryl

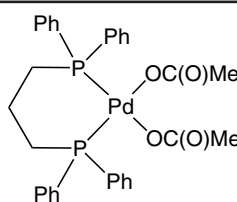
References:

- J. Org. Chem.* **2014**, 79, 6663

46-0257

NEW

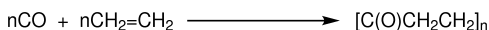
Diacetato[1,3-bis(diphenylphosphino)propane]palladium(II), 99% (149796-59-8)
C₃₁H₃₂O₄P₂Pd; FW: 636.95; yellow-brown solid
moisture sensitive



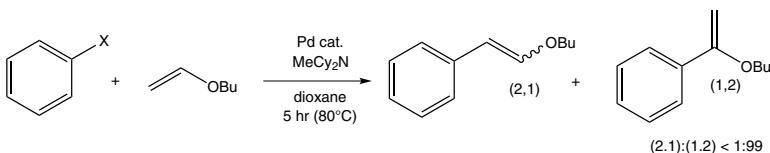
250mg
1g

Technical Notes:

- Catalyst used for the copolymerization of ethene with carbon monoxide.
- Catalyst used in the Heck reactions of vinyl ethers.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

- Mod. Res. in Catal.*, **2013**, 2, 93.
- J. Am. Chem. Soc.*, **2010**, 132, 79.

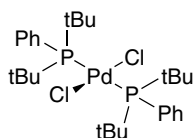
PALLADIUM (Compounds)

46-0420

NEW

Dichlorobis(di-*t*-butylphenylphosphino)palladium(II), 99% (34409-44-4)

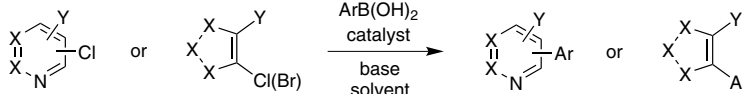
C₂₈H₄₆Cl₂P₂Pd; FW: 621.94; colorless to pale-yellow solid



250mg
1g

Technical Notes:

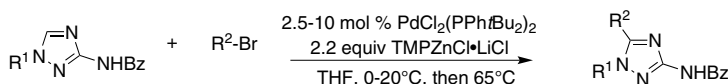
1. Catalyst for Suzuki-Miyaura Couplings of Heteroatom-Substituted Heteroaryl Chlorides
2. Catalyst for the Negishi Approach to 1,5-Disubstituted 3-Amino-1H-1,2,4-triazoles



Tech. Note (1)
Ref. (1)

X = O, S, CR, N, NR

Y = R, OR, SR, COOR, NH₂



Tech. Note (2)
Ref. (2)

References:

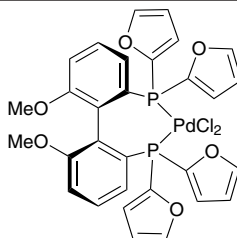
1. *J. Org. Chem.*, **2007**, 72, 5104
2. *Org. Lett.*, **2015**, 17, 4678

46-0188

NEW

Dichloro[(*R*)-(+)-2,2'-bis(di-2-furanylphosphino)-6,6'-dimethoxy-1,1'-biphenyl]palladium(II) (1338245-54-7)

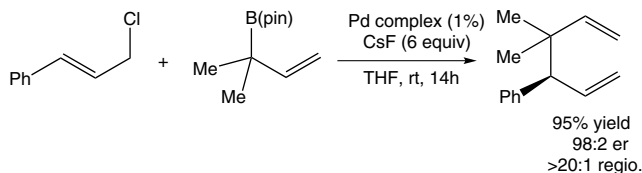
C₃₀H₂₄Cl₂O₆P₂Pd; FW: 719.78; pale yellow powdr.



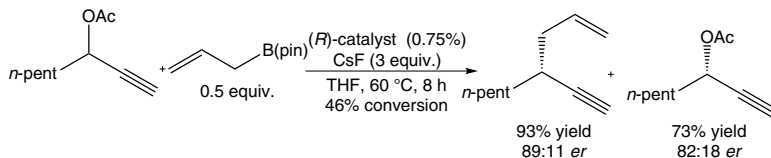
50mg
250mg

Technical Notes:

1. This Palladium-complex is used for the asymmetric cross-coupling of allylboron reagents with allylic electrophiles.
2. The catalyst is used for the kinetic resolution of propargylic acetates to give enantioenriched 1,5-enynes.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

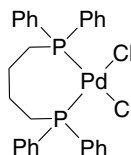
1. *J. Am. Chem. Soc.*, **2014**, 136, 7092.
2. *Adv. Synth. Catal.*, **2013**, 355, 3413.

PALLADIUM (Compounds)

46-0468

NEW

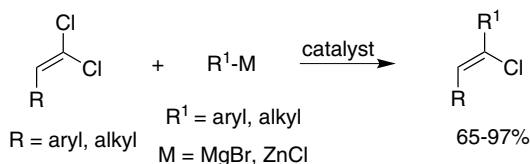
Dichloro[1,4-bis(diphenylphosphino)butane]palladium(II), 99% (29964-62-3)
 $C_{28}H_{28}Cl_2P_2Pd$; FW: 603.80; light-yellow powdr.



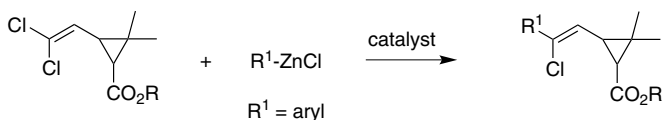
1g
5g

Technical Notes:

- Catalyst for the Grignard coupling for regio- and stereoselective monoalkylation and arylation of 1,1-dichloro-1-alkenes
- Synthetic pyrethroids: catalyst for the Negishi coupling of (2,2-dihaloethenyl)cyclopropanecarboxylates



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

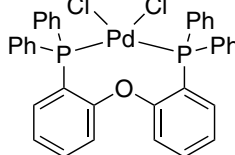
References:

- J. Am. Chem. Soc.*, **1987**, 109, 1257
- J. Org. Chem.*, **1991**, 56, 4052

46-0463

NEW

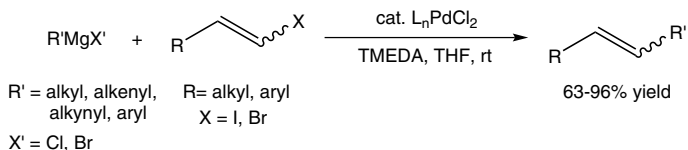
Dichloro[bis[2-(diphenylphosphino)phenyl]ether]palladium(II), 98% (205319-06-8)
 $C_{36}H_{28}Cl_2OP_2Pd$; FW: 715.88; yellow powdr.



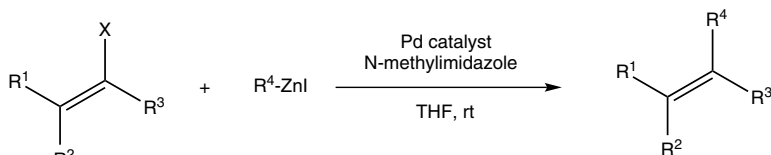
1g
5g

Technical Notes:

- Stereoretentive palladium-catalyzed Kumada-Corriu couplings of alkenyl halides at room temperature.
- Highly selective reactions of unbiased alkenyl halides: Negishi-Plus couplings.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

- Org. Lett.*, **2014**, 16, 4066
- Org. Lett.*, **2011**, 13, 3822

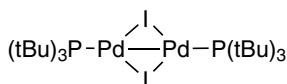
PALLADIUM (Compounds)

46-0310

NEW

Di-μ-iodobis(tri-*t*-butylphosphino)dipalladium(II), 98% (166445-62-1)

C₂₄H₅₄I₂P₂Pd₂; FW: 871.28; black solid



250mg

1g

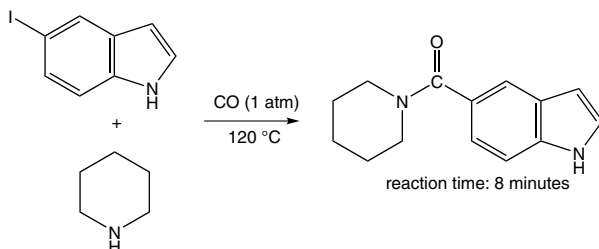
Technical Notes:

1. Catalyst used for the highly efficient C-SeCF₃ coupling of aryl iodides.
2. Catalyst used for rapid carbonylative coupling reactions.



Tech. Note (1)

Ref. (1)



Tech. Note (2)

Ref. (2)

References:

1. *Angew. Chem. Int. Ed.*, **2015**, 54, 10322
2. *Org. Biomol. Chem.*, **2011**, 9, 3499

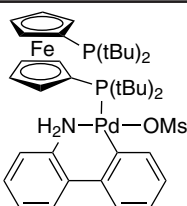
46-2158

NEW

Methanesulfonato(1,1'-bis(di-*t*-butylphosphino)ferrocene)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [DTBPF Palladacycle Gen. 3]

C₃₉H₅₇FeNO₃P₂PdS; FW: 844.16; orange powdr.

Note: Patents: PCT/US2013/030779, US Serial No. 13/799620



250mg

1g

5g

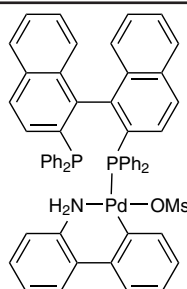
46-2153

NEW

Methanesulfonato[2,2'-bis(diphenylphosphino)-1,1'-binaphthyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [BINAP Palladacycle Gen. 3]

C₅₇H₄₈NO₃P₂PdS; FW: 992.41; off-white powdr.

Note: Patents: PCT/US2013/030779, US Serial No. 13/799620.



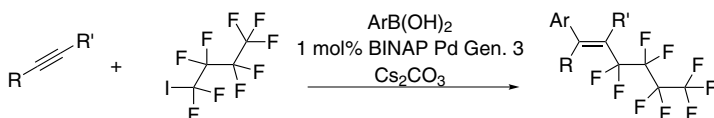
250mg

1g

5g

Technical Note:

1. Palladium catalyst for carboperfluoro-alkylation of terminal and internal alkynes to tri- and tetrasubstituted olefins.



Tech. Note (1)

Ref. (1)

References:

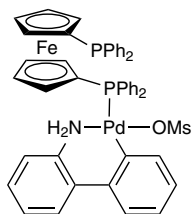
1. *ACS Catal.*, **2016**, 6, 3452.

PALLADIUM (Compounds)

46-2128

NEW

Methanesulfonato[1,1'-bis(diphenylphosphino)ferrocene][(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [DPPF Palladacycle Gen. 3] (1445086-28-1)
 $C_{47}H_{41}FeNO_3P_2PdS$; FW: 924.11; yellow powdr.
 Note: Patents: PCT/US2013/030779, US Serial No. 13/799620

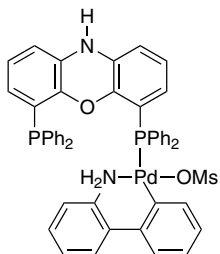


250mg
1g
5g

46-0959

NEW

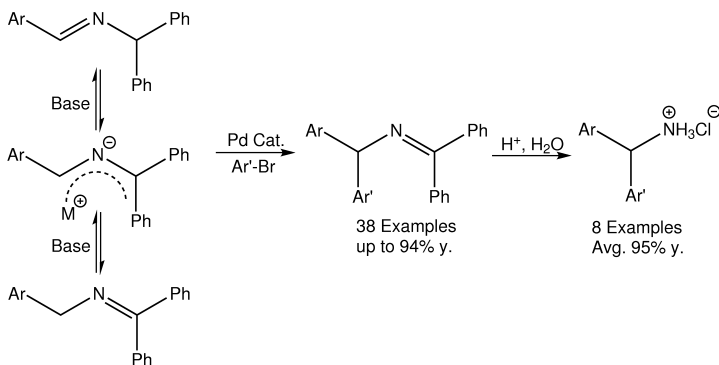
Methanesulfonato[4,6-bis(diphenylphosphino)phenoxazine][(2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [NiXantphos Palladacycle Gen. 3] (1602922-03-1)
 $C_{49}H_{40}N_2O_4P_2PdS$; FW: 921.29; light green yellow solid
 Note: Patents: PCT/US2013/030779, US Serial No. 13/799620



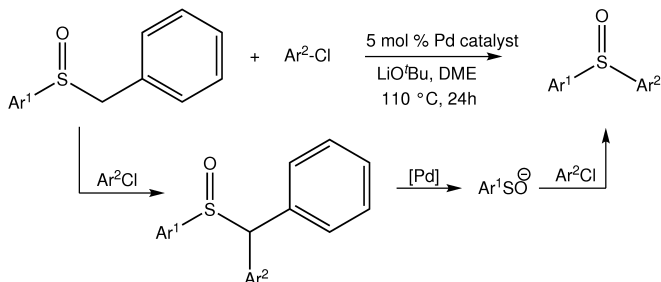
100mg
500mg
2g

Technical Notes:

1. Synthesis of diarylmethylamines via palladium-catalyzed arylation of 1,1,3-triaryl-2-azaallyl anions.
2. Catalyst used in the generation of diaryl sulfoxides from aryl benzyl sulfoxides and aryl chlorides.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

1. *Chem Sci.* **2014**, 5, 2383
2. *Org. Lett.*, **2015**, 17, 1168

PALLADIUM (Compounds)

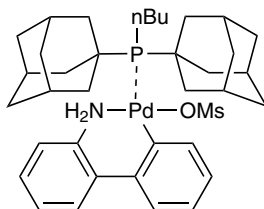
46-0278

NEW

Methanesulfonato(diadamantyl-n-butylphosphino)-2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 95% [cataCXium® A Palladacycle Gen. 3]

C₃₇H₅₂NO₃PPdS; FW: 728.27; off-white powdr.

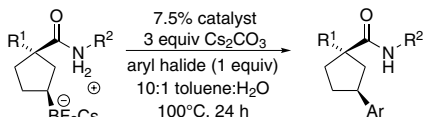
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620. Patent WO 0210178.



250mg
1g
5g

Technical Note:

- Precatalyst for the palladium-catalyzed cross-coupling of cesium trifluoroborate salts with aryl halides



Tech. Note (1)
Ref. (1)

References:

- Org. Lett.*, **2015**, 17, 940.

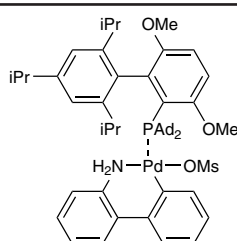
46-0480

NEW

Methanesulfonato[2-(di-1-adamantylphosphino)-3,6-dimethoxy-2',4',6'-tri-*i*-propyl-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [AdBrettPhos Palladacycle Gen. 3] (1445972-29-1)

C₅₆H₇₄NO₃PPdS; FW: 1010.65; brown to green solid

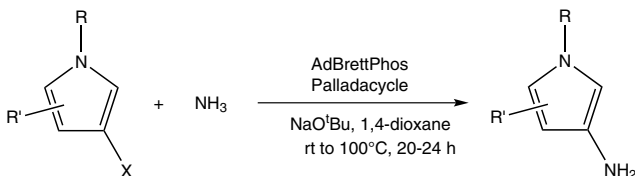
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620



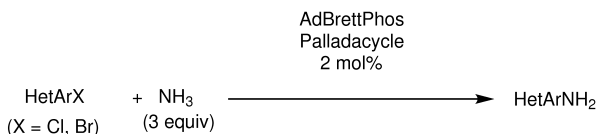
50mg
250mg

Technical Note:

- Palladium catalyst used in the highly selective monoarylation of ammonia.



Tech. Note (1)
Ref. (2)



Tech. Note (1)
Ref. (2)

References:

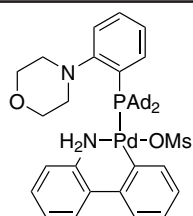
- Org. Lett.*, **2013**, 15, 3734
- ACS Catal.*, **2015**, 5, 1386

46-0935

NEW

Methanesulfonato{N-[2-(di-1-adamantylphosphino)phenyl]morpholine}(2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [Mor-Dalphos Palladacycle Gen. 3]

C₄₃H₅₅N₂O₄PPdS; FW: 833.37; Beige to brown solid
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620



250mg
1g

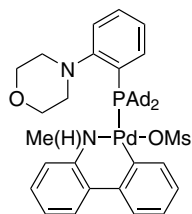
PALLADIUM (Compounds)

46-0940

NEW

Methanesulfonato{N-[2-(di-1-adamantylphosphino)phenyl]morpholine}(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% MorDalphos Palladacycle Gen. 4

C₄₄H₅₇N₂O₄PPdS; FW: 847.39; off-white to gray solid
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620.



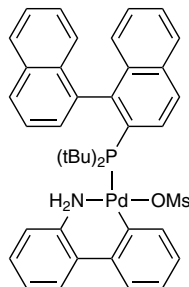
250mg
1g

46-0357

NEW

Methanesulfonato(2-di-t-butylphosphino-1,1'-binaphthyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 95% [TrixiePhos Palladacycle Gen. 3]

C₄₁H₄₄NO₃PPdS; FW: 768.25; white to off-white powdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620



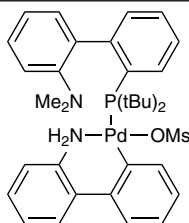
100mg
500mg
2g

46-2135

NEW

Methanesulfonato[2-(di-t-butylphosphino)-2'-(N,N-dimethylamino)-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [t-BuDavePhos Palladacycle Gen. 3] (1445085-92-6)

C₃₅H₄₅N₂O₃PPdS·CH₂Cl₂; FW: 711.20; green-yellow powdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620



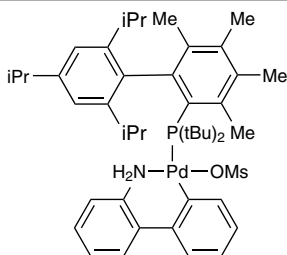
250mg
1g
5g

46-2163

NEW

Methanesulfonato(2-di-t-butylphosphino-3,4,5,6-tetramethyl-2',4',6'-tri-i-propylbiphenyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 95% [Me4 t-ButylXPhos Palladacycle Gen. 3] (1507403-85-1)

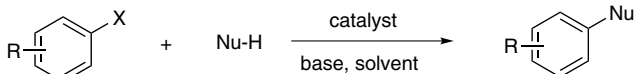
C₄₆H₆₆NO₃PPdS; FW: 850.48; dark green powdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620



100mg
500mg
2g

Technical Note:

1. Catalyst for cross-coupling reactions



Tech. Note (1)
Ref. (1)

References:

1. *Org. Lett.* **2013**, *15*, 2876

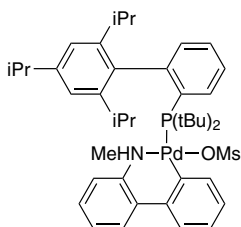
PALLADIUM (Compounds)

46-0330

NEW

Methanesulfonato(2-di-*i*-butylphosphino-2',4',6'-tri-*i*-propyl-1,1'-biphenyl) (2'-methylamino-1,1'-biphenyl-2-yl) palladium(II) dichloromethane adduct, min. 98% [t-BuXphos Palladacycle Gen. 4] (1599466-89-3)

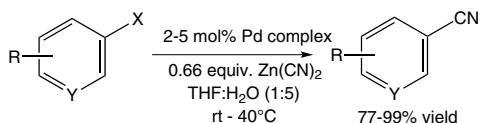
$C_{63}H_{60}NO_3PPdS$; FW: 808.40; white powdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620. Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methylamino-1,1'-biphenyl-2-yl- Palladacycles Gen. 4) component.



250mg
1g
5g

Technical Note:

- Alternative* N-methyl catalyst for mild palladium-catalyzed cyanation of (hetero)aryl halides and triflates in aqueous media.



Tech. Note (1)
Ref. (1)

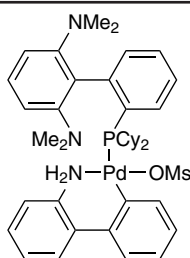
References:

- Org. Lett.*, **2015**, 17, 202. (Note this reference is for is for the non-methylated palladacycle, 46-0323, with the same ligand.)

46-0487

NEW

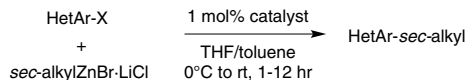
Methanesulfonato(2-dicyclohexylphosphino-2',6'-bis(dimethylamino)-1,1'-biphenyl) (2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [CPhos Palladacycle Gen. 3] (1447963-73-6)
 $C_{41}H_{54}N_3O_3PPdS$; FW: 806.35; white to off-white powdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620.



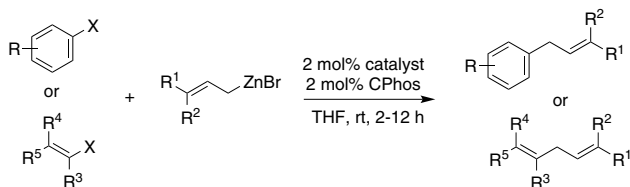
100mg
500mg
2g

Technical Notes:

- Catalyst for the highly selective cross-coupling of secondary alkylzinc reagents with heteroaryl halides
- Catalyst for the completely linear-selective Negishi cross-coupling of allylzinc halides with aryl and vinyl electrophiles



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

- Org. Lett.*, **2014**, 16, 4638
- Angew. Chem. Int. Ed.*, **2013**, 52, 14098

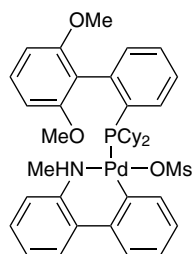
PALLADIUM (Compounds)

46-0380

NEW

Methanesulfonato(2-dicyclohexylphosphino-2',6'-dimethoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct min. 98% [SPhos Palladacycle Gen. 4] (1599466-87-1)

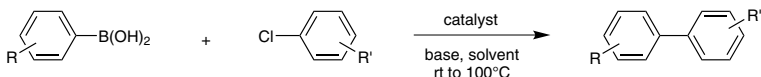
C₄₀H₅₀NO₅PPdS; FW: 794.29; off-white to tan pwdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620. Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methylamino-1,1'-biphenyl-2-yl- Palladacycles Gen. 4) component.



250mg
1g
5g

Technical Note:

- Alternative* Catalyst for the Suzuki-Miyaura Cross-Coupling reaction



Tech. Note (1)
Ref. (1)

References:

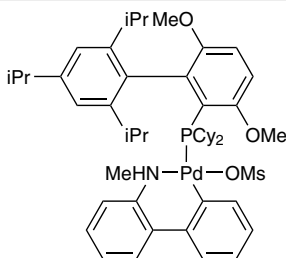
- J. Am. Chem. Soc., **2005**, 127, 4685. (Note this reference is for Pd₂(dba)₃ and SPhos.)

46-0333

NEW

Methanesulfonato(2-dicyclohexylphosphino-3,6-dimethoxy-2',4',6'-tri-*i*-propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [BrettPhos Palladacycle Gen. 4] (1599466-83-7)

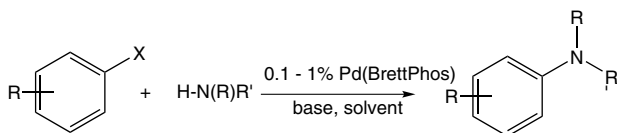
C₄₉H₆₈NO₅PPdS; FW: 920.53; off-white to beige pwdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620. Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methylamino-1,1'-biphenyl-2-yl- Palladacycles Gen. 4) component.



250mg
1g
5g

Technical Note:

- Catalyst used for the N-arylation of amines.



Tech. Note (1)
Ref. (1)

References:

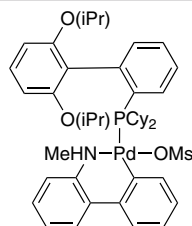
- J. Org. Chem., **2014**, 79, 4161
- Chem. Sci. **2013**, 4, 916

46-0395

NEW

Methanesulfonato(2-dicyclohexylphosphino-2',6'-di-*i*-propoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [RuPhos Palladacycle Gen. 4] (1599466-85-9)

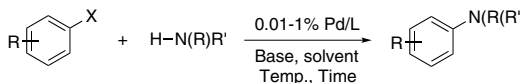
C₄₄H₅₈NO₅PPdS; FW: 850.40; white pwdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620. Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methylamino-1,1'-biphenyl-2-yl- Palladacycles Gen. 4) component.



250mg
1g
5g

Technical Note:

- Catalyst for the Buchwald-Hartwig Cross-Coupling Reaction



Tech. Note (1)
Ref. (1)

PALLADIUM (Compounds)

References:

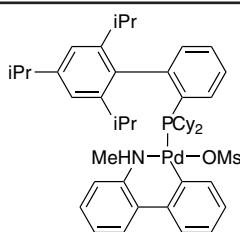
1. *J. Org. Chem.*, **2014**, 79, 4161

46-0327

NEW

Methanesulfonato[2-dicyclohexylphosphino-2',4',6'-tri-*i*-propyl-1,1'-biphenyl] (2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [XPhos Palladacycle Gen. 4] (1599466-81-5)

$C_{47}H_{64}NO_3PPdS$; FW: 860.48; white powdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620. Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methylamino-1,1'-biphenyl-2-yl- Palladacycles Gen. 4) component.



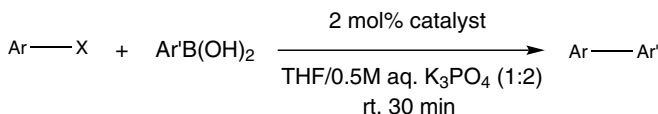
250mg

1g

5g

Technical Note:

1. Palladium catalyst used in the Suzuki-Miyaura coupling of unstable boronic acids



Tech. Note (1)
Ref. (1)

References:

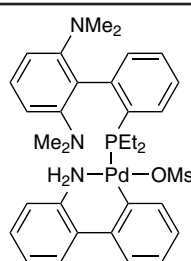
1. *J. Org. Chem.*, **2014**, 79, 4161

46-0348

NEW

Methanesulfonato[2-diethylphosphino-2',6'-bis(di-methylamino)-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [EtCPhos Palladacycle Gen. 3]

$C_{33}H_{42}N_3O_3PPdS$; FW: 698.17; white to off-white solid
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620



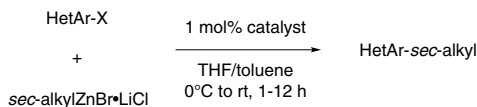
50mg

250mg

1g

Technical Note:

1. Palladium catalyst for the cross-coupling of secondary alkylzinc reagents with heteroaryl halides



*excellent selectivity
for non-rearranged products*

Tech. Note (1)
Ref. (1)

References:

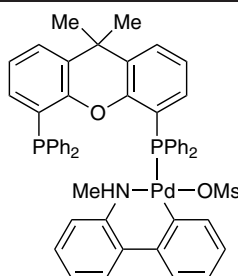
1. *Org. Lett.*, **2014**, 16, 4638

46-0388

NEW

Methanesulfonato[9,9-dimethyl-4,5-bis(di-phenylphosphino)xanthene](2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [Xantphos Palladacycle Gen. 4] (1621274-19-8)

$C_{63}H_{42}NO_3P_2PdS$; FW: 962.38; yellow solid
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620. Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methylamino-1,1'-biphenyl-2-yl- Palladacycles Gen. 4) component.



250mg

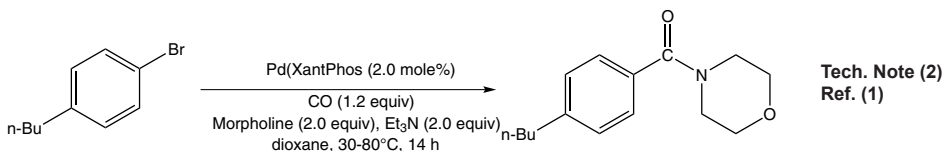
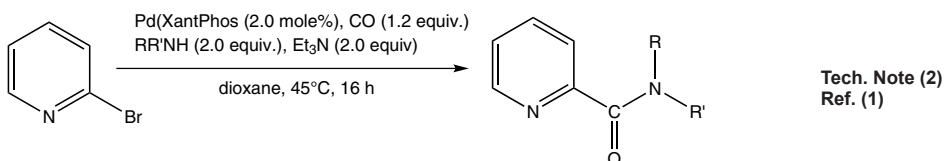
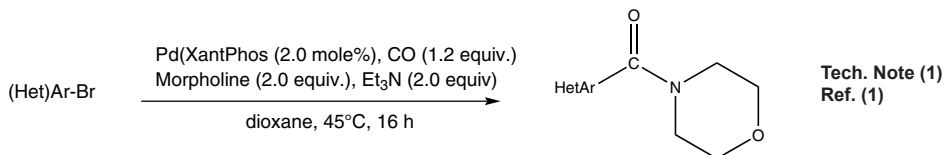
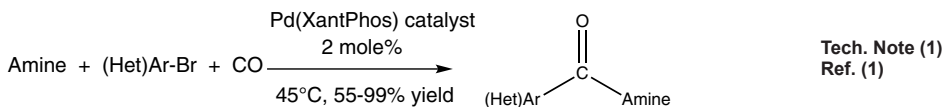
1g

5g

Technical Notes:

1. Catalyst used for the aminocarbonylation of (hetero)aryl bromides.
2. Catalyst used in the aminocarbonylation of bromopyridine and alkyl-substituted bromobenzene.

PALLADIUM (Compounds)



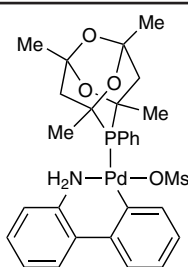
References:

1. *Org. Lett.*, **2014**, *16*, 4296

46-0392

NEW

Methanesulfonato(1,3,5,7-tetramethyl-8-phenyl-2,4,6-trioxa-8-phosphaadamantane)(2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [MeCgPPh Palladacycle Gen. 3]
 $\text{C}_{29}\text{H}_{34}\text{NO}_6\text{PPdS} \cdot \text{CH}_2\text{Cl}_2$; FW: 662.04; white to tan powdr.
air sensitive, moisture sensitive
 Note: Patents: PCT/US2013/030779, US Serial No. 13/799620

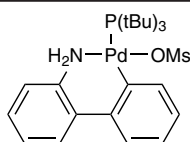


500mg
2g

46-0387

NEW

Methanesulfonato(tri-*t*-butylphosphino)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [P(*t*-Bu)₃ Palladacycle Gen. 3] (1445086-17-8)
 $\text{C}_{25}\text{H}_{40}\text{NO}_3\text{PPdS}$; FW: 572.05; white powdr.
 Note: Patents: PCT/US2013/030779, US Serial No. 13/799620.

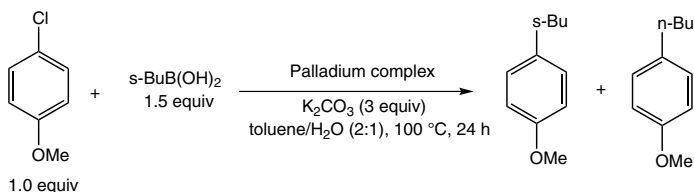


250mg
1g
5g

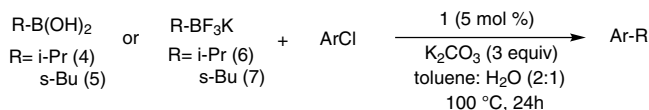
Technical Notes:

1. Pd-catalyzed cross-coupling reaction of *s*-BuB(OH)₂ and 4-chloroanisole.
2. Pd-catalyzed cross-coupling reaction of secondary alkylboronic acids and aryl chlorides.
3. Pd-catalyzed cross-coupling reaction of secondary alkyltrifluoroborates and aryl chlorides

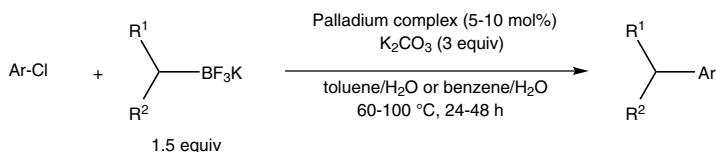
PALLADIUM (Compounds)



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (1)



Tech. Note (2)
Ref. (1)

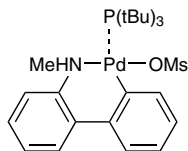
References:

1. *J. Am. Chem. Soc.*, **2014**, *136*, 14027

46-0385

NEW

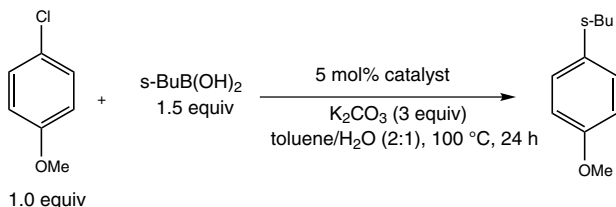
Methanesulfonato(tri-*t*-butylphosphino)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [P(*t*-Bu)₃ Palladacycle Gen. 4] (1621274-11-0)
C₂₆H₄₂NO₃PPdS; FW: 586.08; tan to yellow powdr.
Note: Patents: PCT/US2013/030779, US Serial No. 13/799620 Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methylamino-1,1'-biphenyl-2-yl- Palladacycles Gen. 4) component.



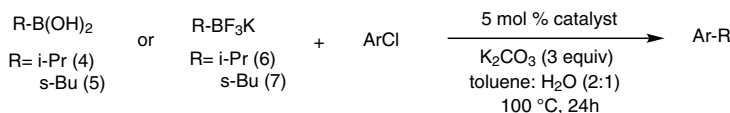
250mg
1g
5g

Technical Notes:

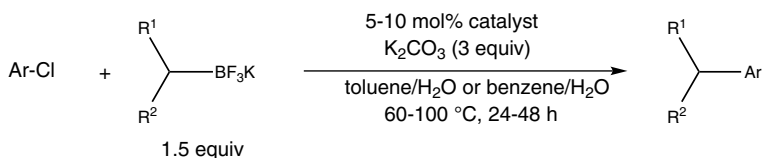
1. Alternative* Pd-catalyzed cross-coupling reaction of s-BuB(OH)₂ and 4-chloroanisole.
2. Alternative* Pd-catalyzed cross-coupling reaction of secondary alkylboronic acids and aryl chlorides.
3. Alternative* Pd-catalyzed cross-coupling reaction of secondary alkyltrifluoroborates and aryl chlorides



Tech. Note (1)
Ref. (1)



Tech. Note (2)



Tech. Note (3)

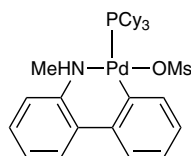
PALLADIUM (Compounds)

References:

1. *J. Am. Chem. Soc.*, **2014**, 136, 14027. (Note this reference is for the non-methylated palladacycle, 46-0387, with the same ligand.)

46-0379 **NEW** **Methanesulfonato(tricyclohexylphosphino) (2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [PCy₃ Palladacycle Gen. 4]**

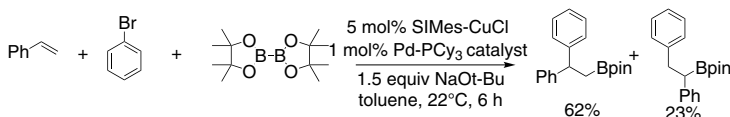
C₃₂H₄₈NO₃PPdS; FW: 664.19; white powdr.
 Note: Patents: PCT/US2013/030779, US Serial No. 13/799620. Buchwald Palladacycle Precatalyst Kit 4 (Methanesulfonato-2'-methylamino-1,1'-biphenyl-2-yl- Palladacycles Gen. 4) component.



250mg
1g
5g

Technical Note:

1. N-Methyl Alternative* Catalyst for the alkene carboboration enabled by synergistic catalysis



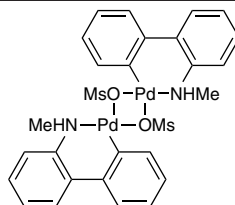
Tech. Note (1)
Ref. (1)

References:

1. *Chem. Eur. J.*, **2014**, 20, 12032. (Note this reference is for the non-methylated palladacycle, 46-0239, with the same ligand.)

46-1553 **NEW** **(2'-Methylamino-1,1'-biphenyl-2-yl)methanesulfonatopalladium(II) dimer, min. 98% (1581285-85-9)**

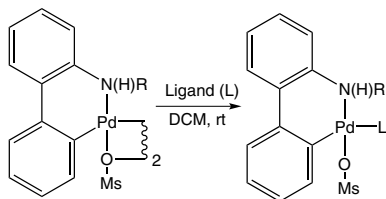
C₂₈H₃₀N₂O₆Pd₂S₂; FW: 767.52; light gray powdr.
 air sensitive
 Note: Patents: PCT/US2013/030779, US Serial No. 13/799620



500mg
2g

Technical Note:

1. Dimeric palladium precursor, that when treated with phosphines at room temperature in dichloromethane, provides N-substituted precatalysts. These catalysts are useful in the aminocarbonylation of (hetero)aryl bromides, and general C-C and C-N cross-coupling reactions.



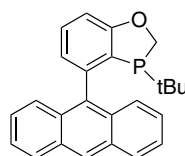
References:

1. *Org. Lett.*, **2014**, 16, 4296
2. *J. Org. Chem.*, **2014**, 79, 4161

PHOSPHORUS (Compounds)

15-1960 **NEW** **4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 98+% rac-AntPhos**

(1268693-24-8)
 C₂₅H₂₃O₃P; FW: 370.42; pale yellow powdr.
 air sensitive, (store cold)
 Note: Sold in collaboration with Zejun for research purposes only. Patents ZL201310020371.1, CN 201610056390.

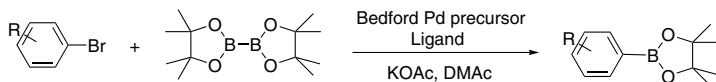


25mg
100mg
500mg

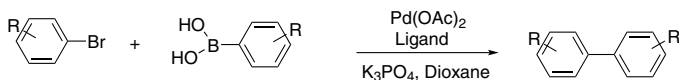
PHOSPHORUS (Compounds)

Technical Notes:

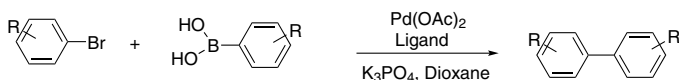
1. Ligand/palladium catalyst for general Miyaura borylation reactions.
2. Ligand/palladium catalyst for general and sterically demanding Suzuki-Miyaura cross-coupling reactions.
3. Ligand/palladium catalyst for aryl-alkyl Suzuki-Miyaura cross-coupling reactions.
4. Ligand/nickel catalyst for intramolecular reductive cyclization¹
5. Ligand/palladium catalyst for Dearomative cyclization¹



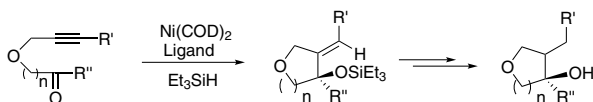
Tech. Note (1)
Ref. (1)



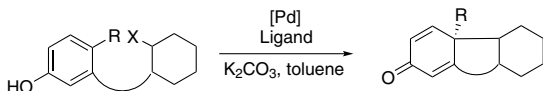
Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)



Tech. Note (5)
Ref. (5,6)

References:

1. *Org. Lett.*, **2011**, 13, 1366.
2. *Chem. Eur. J.*, **2013**, 19, 2261.
3. *Org. Chem. Front.*, **2014**, 1, 225.
4. *Angew. Chem. Int. Ed.*, **2015**, 54, 2520.
5. *Angew. Chem. Int. Ed.*, **2015**, 54, 3033.
6. *Tetrahedron*, **2016**, 72, 1782.

15-1963 NEW	(R)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 98+% (>99% ee) [(R)-AntPhos] (1456816-37-7) $C_{25}H_{23}O_3P$; FW: 370.42; light-yello xtl. <i>air sensitive, (store cold)</i> Note: Sold in collaboration with Zejun for research purposes only. Patents ZL201310020371.1, CN 201610056390.		25mg 100mg 500mg
15-1967 NEW	(S)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 99+% (>99% ee) [(S)-AntPhos] (1807740-34-6) $C_{25}H_{23}O_3P$; FW: 370.42; light yellow xtl. <i>air sensitive, (store cold)</i> Note: Sold in collaboration with Zejun for research purposes only. Patents ZL201310020371.1, CN 201610056390.		25mg 100mg 500mg

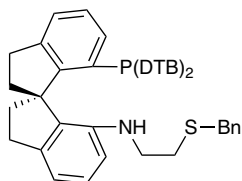
PHOSPHORUS (Compounds)

15-1613

NEW

(R)-(+)-7-[N-(2-Benzylthio)ethylamino]-7'-[bis(3,5-di-*t*-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-DTB-SpiroSAP-Bn] (1809609-52-6)

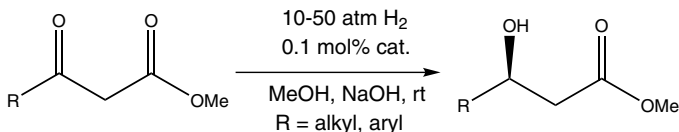
C₅₄H₆₈NPS; FW: 794.16; off-white solid
air sensitive



25mg
100mg

This technical note is for the iridium complex 77-2510. This is an analogous ligand included in the reference below.
Technical Note:

1. Catalyst used for the asymmetric hydrogenation of β -alkyl- β -ketoesters.



Tech. Note (1)
Ref. (1)

References:

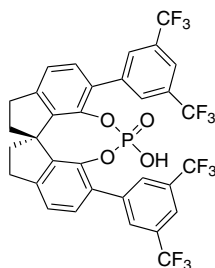
1. *Angew. Chem. Int. Ed.*, **2015**, 54, 8791

15-0527

NEW

(11aR)-3,7-Bis[3,5-bis(trifluoromethyl)phenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1297613-76-3)
C₃₃H₁₉F₁₂O₄P; FW: 738.46; white to light-yellow powder.

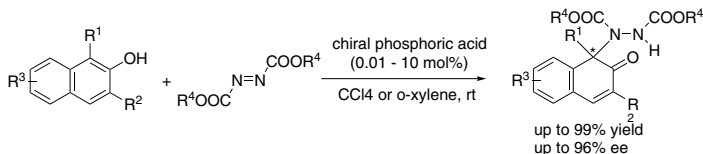
Note: Sold in collaboration with Daicel for research purposes only.



25mg
100mg

Technical Note:

1. Asymmetric dearomatization of β -naphthols through an amination reaction catalyzed by a chiral phosphoric acid.



Tech. Note (1)
Ref. (1)

References:

1. *Angew. Chem. Int. Ed.*, **2015**, 54, 647.

15-0528

NEW

(11aS)-3,7-Bis[3,5-bis(trifluoromethyl)phenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1258327-07-9)

C₃₃H₁₉F₁₂O₄P; FW: 738.46; white to light-yellow powder.

Note: Sold in collaboration with Daicel for research purposes only.

Technical Note:

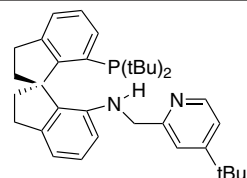
1. See 15-0527 (page 92)

15-5147

NEW

(R)-(+)-7-Bis(3,5-di-*t*-butylphenyl)phosphino-7'-[4-*t*-butylpyridine-2-ylmethyl]amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP-4-*t*-Bu (1298133-38-6)

C₅₅H₇₁N₂P; FW: 791.14; white solid; m.p. 86-88°
air sensitive

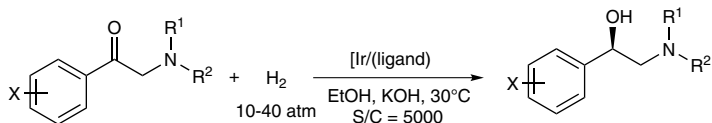


25mg
100mg

PHOSPHORUS (Compounds)

Technical Note:

- Enantioselective synthesis of chiral 1,2-amino alcohols via asymmetric hydrogenation of α -amino ketones with chiral spiro iridium catalysts.



Tech. Note (1)
Ref. (1)

$R^1 = \text{H, Bn}$
 $R^2 = \text{Me, i-Pr, t-Bu}$

>99% yield; 97-99.9% ee
TON up to 100,000

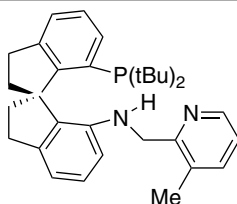
References:

- Synthesis*, **2014**, 46, 2910.

15-5158

NEW

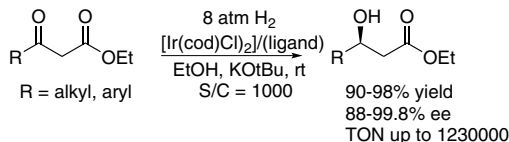
(R)-(+)-7-Bis(3,5-di-*t*-butylphenyl)phosphino-7'-[(3-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP-3-Me (1298133-36-4)
 $C_{52}H_{68}N_2P$; FW: 749.06; white to off-white solid; m.p. 160-161°
air sensitive



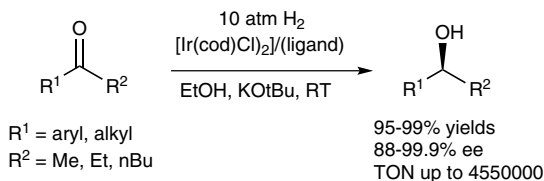
25mg
100mg

Technical Notes:

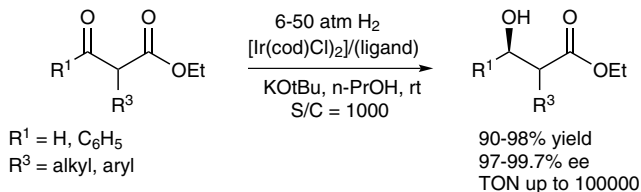
- Iridium/ligand catalyst for the highly efficient, asymmetric hydrogenation of β -aryl and β -ketoesters.
- Extremely efficient chiral iridium catalyst used for the asymmetric hydrogenation of ketones.
- Iridium/ligand catalyst for the highly efficient, asymmetric hydrogenation of β -aryl and β -ketoesters.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)

References:

- Angew. Chem Int. Ed.*, **2011**, 50, 7329.
- Angew. Chem Int. Ed.*, **2012**, 51, 201.
- Org. Lett.*, **2012**, 14, 6158.

PHOSPHORUS (Compounds)

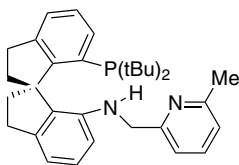
15-5148

NEW

(R)-(+)-7-Bis(3,5-di-*t*-butylphenyl)phosphino-7'-[(6-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP-6-Me (1298133-26-2)

C₅₂H₆₅N₂P; FW: 749.06; white solid; m.p. 153-155°

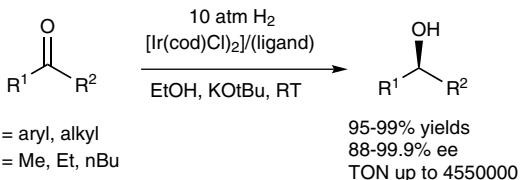
air sensitive



25mg
100mg

Technical Note:

- Extremely efficient chiral iridium catalyst used for the asymmetric hydrogenation of ketones.



Tech. Note (1)
Ref. (1)

References:

- Angew. Chem. Int. Ed.*, **2011**, 50, 7329.

15-5159

NEW

(S)-(-)-7-Bis(3,5-di-*t*-butylphenyl)phosphino-7'-[(3-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (S)-DTB-SpiroPAP-3-Me

C₅₂H₆₅N₂P; FW: 749.06; white to off-white solid; m.p. 162-164°

air sensitive

25mg
100mg

Technical Note:

- See 15-5158 (page 93)

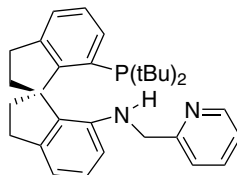
15-5166

NEW

(R)-(+)-7-Bis(3,5-di-*t*-butylphenyl)phosphino-7'-[(pyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP (1298133-21-7)

C₅₁H₆₃N₂P; FW: 735.03; white solid; m.p. 172-174°

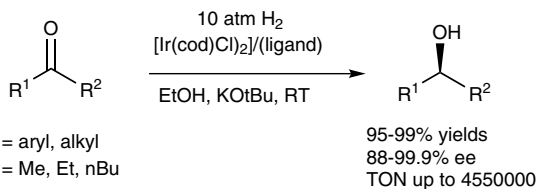
air sensitive



25mg
100mg

Technical Note:

- Extremely efficient chiral iridium catalyst used for the asymmetric hydrogenation of ketones.



Tech. Note (1)
Ref. (1)

References:

- Angew. Chem. Int. Ed.*, **2011**, 50, 7329

15-5167

NEW

(S)-(-)-7-Bis(3,5-di-*t*-butylphenyl)phosphino-7'-[(pyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (S)-DTB-SpiroPAP (1415636-82-6)

C₅₁H₆₃N₂P; FW: 735.03; white solid; m.p. 170-171°

air sensitive

25mg
100mg

Technical Note:

- See 15-5166 (page 94)

PHOSPHORUS (Compounds)

15-0185

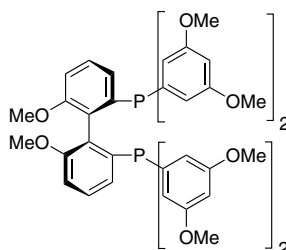
NEW

(R)-(+)-2,2'-Bis[di(3,5-dimethoxyphenyl)phosphino]-6,6'-dimethoxy-1,1'-biphenyl, 98% (R)-ECNU-Phos (1448722-98-2)

$C_{46}H_{48}O_{10}P_2$; FW: 822.82; white solid; m.p. 236-237°

air sensitive, (store cold)

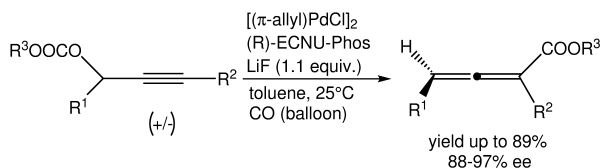
Note: Sold under license from ECNU for research purposes only. Patent CN201310135176.3.



25mg
100mg

Technical Note:

- Efficient ligand for the highly enantioselective synthesis of optically active 2,3-allenoates via carbonylation of racemic propargylic carbonates.



Tech. Note (1)
Ref. (1)

References:

- J. Am. Chem. Soc., **2013**, 135, 11517.

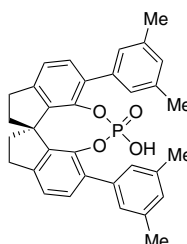
15-0542

NEW

(11aR)-3,7-Bis(3,5-dimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1297613-75-2)

$C_{33}H_{31}O_4P$; FW: 522.57; white to light-yellow powdr.

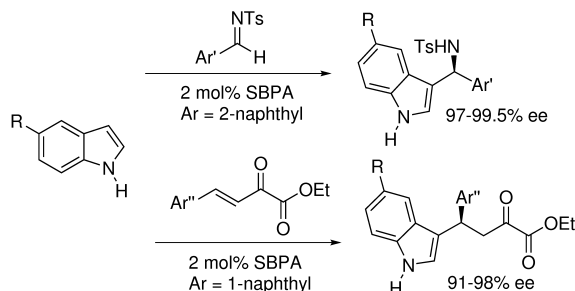
Note: Sold in collaboration with Daicel for research purposes only.



25mg
100mg

Technical Note:

- Spinol-based phosphoric acid (SBPA) as a highly enantioselective catalyst for asymmetric organocatalysis.



Tech. Note (1)
Ref. (1)

References:

- J. Org. Chem., **2011**, 76, 4125.

15-0543

NEW

(11aS)-3,7-Bis(3,5-dimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1412439-82-7)

$C_{33}H_{31}O_4P$; FW: 522.57; white to light-yellow powdr.

Note: Sold in collaboration with Daicel for research purposes only.

Technical Note:

- See 15-0542 (page 95)

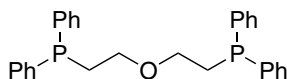
25mg
100mg

PHOSPHORUS (Compounds)

15-0383

NEW

[Bis(2-diphenylphosphino)ethyl]ether,
min. 98% (50595-38-5)
 $C_{28}H_{28}OP_2$; FW: 442.47; pale yellow oil
air sensitive

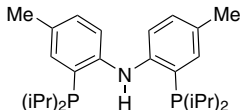


1g
5g
25g

15-0670

NEW

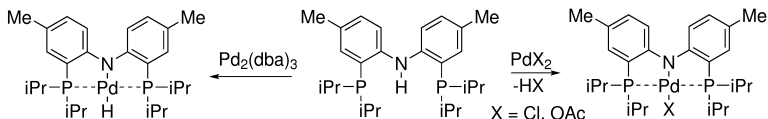
Bis[2-(di-i-propylphosphino)-4-methylphe-
nyl]amine, min. 98% (666856-94-6)
 $C_{26}H_{41}NP_2$; FW: 429.56; white powdr.
air sensitive



100mg
500mg

Technical Note:

- Ligand for PNP pincer complexes of palladium



Tech. Note (1)
Ref. (1)

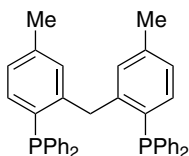
References:

- Organometallics, 2004, 23, 326

15-0358

NEW

Bis[2-(4-methyldiphenylphosphino)phenyl]
methane, 90%
 $C_{39}H_{34}P_2$; FW: 564.64; white powdr.

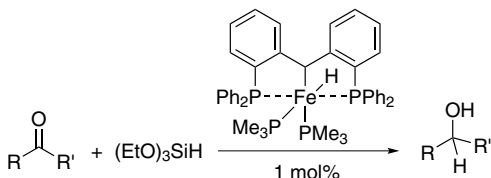


100mg
500mg
2g

*Note: this ligand has no references and the non-methylated analog is shown.

Technical Note:

- Alternative ligand for the iron catalyzed reduction of ketones



Tech. Note (1)
Ref. (1)

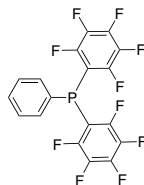
References:

- Organometallics, 2014, 33, 3535

15-0374

NEW

Bis(pentafluorophenyl)phenylphosphine, 97%
(5074-71-5)
 $C_{18}H_5F_{10}P$; FW: 442.20; white powdr.; m.p. 59-61°;
b.p. 105°C/0.3mm; f.p. >110°C
air sensitive

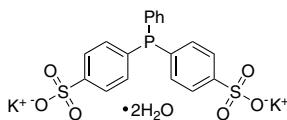


250mg
1g

15-0638

NEW

Bis(p-sulfonatophenyl)phenylphos-
phine dihydrate dipotassium salt, 97%
(308103-66-4)
 $C_{18}H_{13}K_2O_6PS_2$; FW: 498.60(534.63); white
powdr.; m.p. 98-102°
air sensitive



100mg
500mg

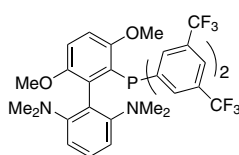
PHOSPHORUS (Compounds)

15-3015

NEW

2-[Bis(3,5-trifluoromethylphenylphosphino)-3,6-dimethoxy-2',6'-dimethylamino-1,1'-biphenyl, 98% (1810068-30-4)
 $C_{34}H_{28}F_{12}N_2O_2P$; FW: 756.56; white to off-white powdr.

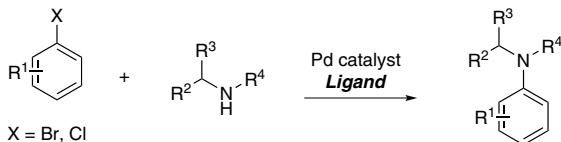
Note: Patents: US 6,395,916, US 6,307,087



100mg
500mg
2g

Technical Note:

- Ligand for the Palladium-catalyzed arylation of α -Branched Secondary Amines



X = Br, Cl

Tech. Note (1)
Ref. (1)

References:

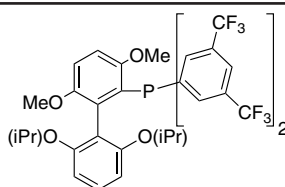
- Angew. Chem. Int. Ed.*, **2015**, 54, 8259

15-3020

NEW

2-[Bis(3,5-trifluoromethylphenylphosphino)-3,6-dimethoxy-2',6'-di-i-propoxy-1,1'-biphenyl, 98% (1810068-31-5)
 $C_{36}H_{31}F_{12}O_4P$; FW: 786.58; white to off-white powdr.

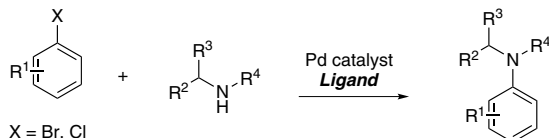
Note: Patents: US 6,395,916, US 6,307,087



250mg
1g
5g

Technical Note:

- Ligand for the Palladium-catalyzed arylation of α -Branched Secondary Amines



X = Br, Cl

Tech. Note (1)
Ref. (1)

References:

- Angew. Chem. Int. Ed.*, **2015**, 54, 8259

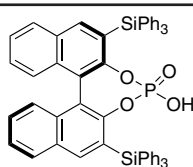
15-0340

NEW

(R)-(-)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, min. 98% [(R)-TiPSY] (791616-55-2)

$C_{96}H_{41}O_4PSi_2$; FW: 865.07; white to light-yellow powdr.; m.p. 329-335°

Note: Sold in collaboration with Daicel for research purposes only.

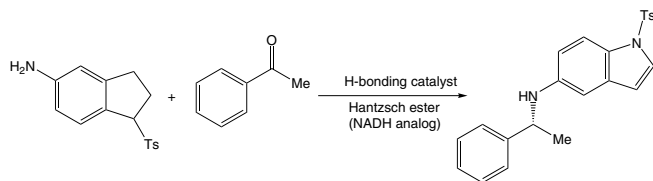


10mg
100mg

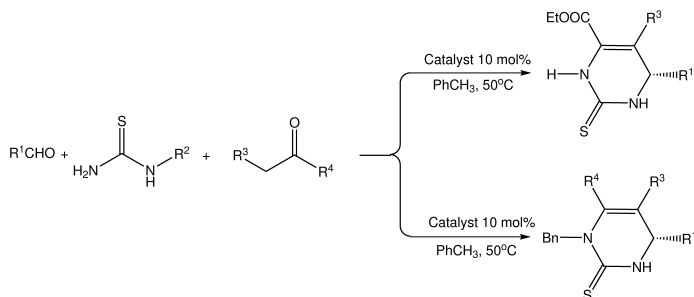
Technical Notes:

- A chiral phosphoric acid catalyst providing a highly stereoselective method for the reductive amination of heterocyclic amines.
- Chiral phosphoric acid used for the enantioselective Biginelli and Biginelli-like reactions.
- Chiral phosphoric acid organocatalyst used in the asymmetric, three-component Povarov reaction involving 2-hydroxystyrenes. An efficient method to access structurally diverse *cis*-disubstituted tetrahydroquinolines in high stereoselectivities of up to >99:1 dr and 97% ee.
- A gold/chiral phosphoric acid catalyst used for the highly stereoselective, three-component reaction of salicylaldehydes, anilines, and alkynols to give aromatic spiroacetals in high yields and stereoselectivities.
- aza-Pinacol Cyclization

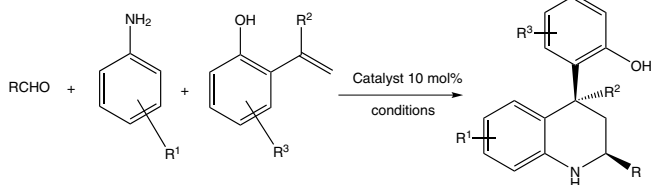
PHOSPHORUS (Compounds)



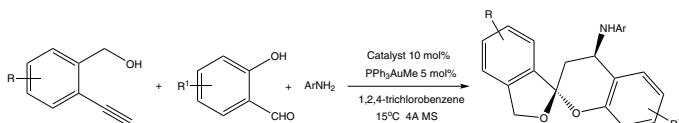
Tech. Note (1)
Ref. (1)



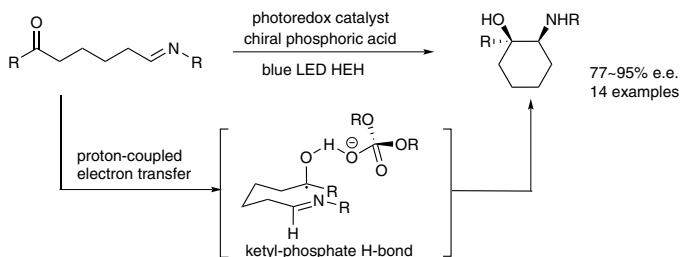
Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)



Tech. Note (5)
Ref. (5)

References:

1. *J. Am. Chem. Soc.* **2006**, 128, 84
2. *J. Am. Chem. Soc.* **2009**, 131, 15301
3. *J. Am. Chem. Soc.* **2012**, 134, 6970
4. *Org. Lett.*, **2013**, 15, 460
5. *J. Am. Chem. Soc.* **2013**, 135, 17735

PHOSPHORUS (Compounds)

15-0341

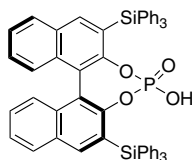
NEW

(S)-(+)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, min. 98%

[(S)-TIPSY] (929097-92-7)

C₂₆H₄₁O₄PSi₃; FW: 865.07; white to light-yellow solid; m.p. 329-335°

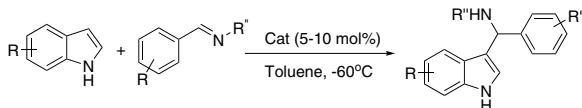
Note: Sold in collaboration with Daicel for research purposes only.



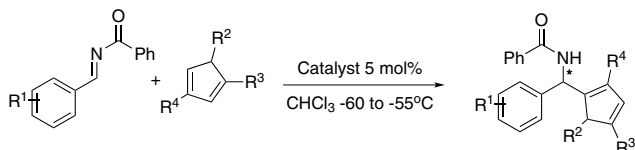
10mg
100mg

Technical Notes:

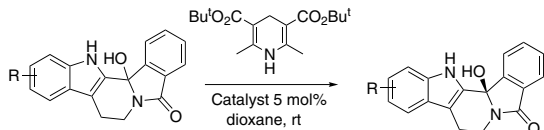
1. Chiral phosphoric acid catalyst used for the highly enantioselective Friedel-Crafts reaction of indoles with imines.
2. Chiral phosphoric acid catalyst used for the highly enantioselective Friedel-Crafts reaction of pyrrole derivatives with N-acyl imines.
3. Chiral phosphoric acid catalyst used for the enantioselective transfer hydrogenation of hydroxylactams providing enantio-enriched tetrahydro-β-carbolines (in dioxane) at room temperature (up to 94% yield, 90% ee).
4. [Rh₂(OAc)₄] chiral phosphonic acid catalyst used for the enantioselective symmetric, three-component reaction of diazo compounds with imines and water yielding β-amino-α-hydroxy acid derivatives.



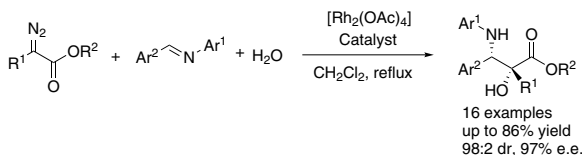
Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (3)
Ref. (3)

References:

1. *J. Am. Chem. Soc.* **2007**, 129, 1484
2. *Org. Lett.*, **2007**, 9, 4065
3. *Org. Lett.*, **2013**, 15, 2688
4. *ChemCatChem*, **2011**, 3, 653

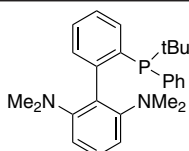
15-3010

NEW

2-(t-Butylphenylphosphino)-2',6'-dimethyl-amino-1,1'-biphenyl, 98% (t-Bu)PhCPhos (1660153-91-2)

C₂₆H₃₃N₂P; FW: 404.53; white to off-white powdr.

Note: Patents: US 6,395,916, US 6,307,087

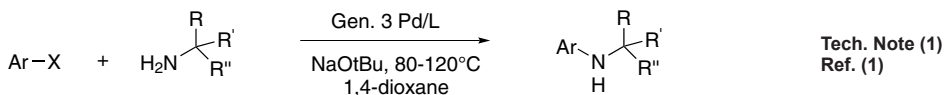


250mg
1g
5g
25g

Technical Note:

1. Ligand for the Palladium-catalyzed Buchwald-Hartwig cross-coupling of hindered primary amines and aryl halides

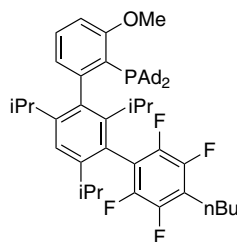
PHOSPHORUS (Compounds)



References:

1. *J. Am. Chem. Soc.*, **2015**, 137, 3085

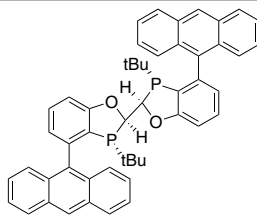
28-0110	Chlorobis(triphenylphosphino)phenylnickel(II), 98% (33571-43-6) See page 57	
15-0690	Chloro(t-butyl)phenylphosphine, 97% (29949-69-7) $\text{C}_{10}\text{H}_{14}\text{ClP}$; FW: 200.65; colorless liq. <i>air sensitive, moisture sensitive</i>	1g 5g
NEW HAZ		
15-1011	Cyclohexyldi-t-butylphosphine, 98% (10wt% in hexanes) (436865-11-1) $\text{C}_{14}\text{H}_{28}\text{P}$; FW: 228.36; colorless liq. <i>air sensitive</i>	5g 25g
NEW		
15-2065	2-(Diadamantylphosphino)-3-methoxy-2',4',6'-tri-i-propyl-3'-(2,3,5,6-tetrafluoro-4-butylphenyl)-1,1'-biphenyl AlPhos (1805783-60-1) $\text{C}_{52}\text{H}_{67}\text{F}_4\text{OP}$; FW: 815.06; white to yellow powdr. <i>air sensitive</i> Note: Patents: US 6,395,916, US 6,307,087	100mg 500mg 2g



Technical Note:

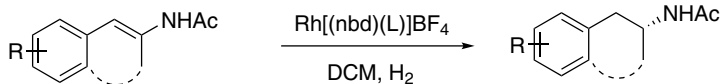
1. See 46-0241 (page 74)

15-1970	(2R,2'R,3R,3'R)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98% (>90% ee), [(2R,2'R,3R,3'R)-Wing-Phos] (1884680-45-8) $\text{C}_{50}\text{H}_{44}\text{O}_2\text{P}_2$; FW: 738.83; light yello powdr. <i>air sensitive, (store cold)</i> Note: Sold in collaboration with Zejun for research purposes only. Patents ZL201310020371.1, CN 201610056390.	25mg 100mg 500mg
NEW		

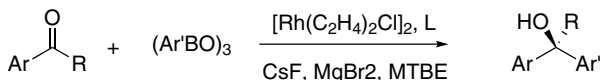


Technical Notes:

1. Ligand/Rhodium catalyst for asymmetric hydrogenation.
2. Ligand/Rhodium catalyst for asymmetric arylboronic reagents addition to aryl ketones.



Tech. Note (1)
Ref. (1)



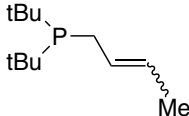
Tech. Note (2)
Ref. (2)

References:

1. *Angew. Chem.Int.Ed.*, **2013**, 52, 4235.
2. *Angew. Chem.Int.Ed.*, **2016**, 55, 4527.

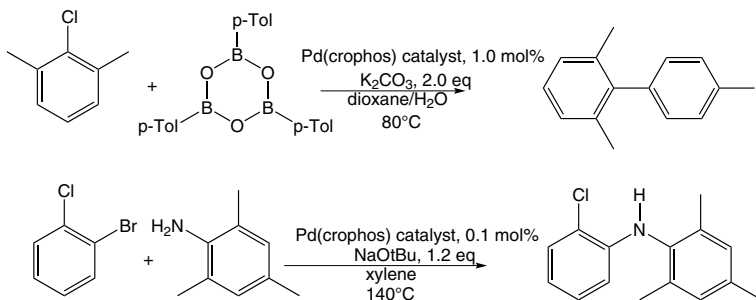
PHOSPHORUS (Compounds)

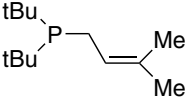
15-1975 NEW	(2S,2'S,3S,3'S)-4,4'-Di(anthracen-9-yl)-3,3'-di-<i>t</i>-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98%, (>99% ee), [(2S,2'S,3S,3'S)-WingPhos] (1435940-19-4) $C_{60}H_{44}O_2P_2$; FW: 738.83; light yellow powdr. <i>air sensitive, (store cold)</i> Note: Sold in collaboration with Zejun for research purposes only. Patents ZL201310020371.1, CN 201610056390.	25mg 100mg 500mg
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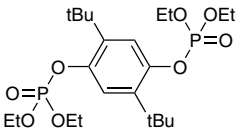
15-1725 NEW HAZ	Di-<i>t</i>-butyl(2-butenyl)phosphine (40% in xylene), 98% m-Crophos® $C_{12}H_{28}P$; FW: 200.30; colorless liq.; b.p. 76-77° (4.0mm) <i>air sensitive</i>	 5g 25g 100g
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Technical Note:

1. Crophos® is a very reactive phosphine ligand used in catalysts that are especially effective for coupling reactions involving bulky reactants.



15-1729 NEW HAZ	Di-<i>t</i>-butyl(3-methyl-2-butenyl)phosphine (40% in xylene), 98% Crophos® $C_{13}H_{27}P$; FW: 214.33; colorless liq. <i>air sensitive</i>	 5g 25g 100g
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15-1375 NEW	2,5-Di-<i>t</i>-butyl-1,4-phenylene tetraethyl bis(phosphonate), 99+% Redox shuttle ANL-RS6 (1350767-15-5) $C_{22}H_{40}O_8P_2$; FW: 494.50; white solid <i>air sensitive, moisture sensitive</i> Note: U.S. Patents: 8,969,625	 500mg 2g
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Redox Shuttles for Lithium Ion Batteries

1. Provides a long term intrinsic overcharge protection of lithium-ion batteries.
2. Maintains the safe operation of lithium-ion batteries.
3. Highly-soluble in conventional non-aqueous, carbonate based electrolytes.
4. Increases battery long-term stability and oxidation potential.

Electrochemical Properties

1. ANL-RS6 (10 mM) exhibits a reversible redox potential of about 4.8V vs Li/Li⁺ (1.2 M LiPF₆ in 3:7 wt/wt mixtures of ethylene carbonate and ethyl methyl carbonate.[1]
2. In cell tests using LiMn₂O₄ and Li_{1.2}Ni_{0.15}Co_{0.1}Mn_{0.55}O₂ as the cathode materials, overcharge protection was provided at 4.75 V vs. Li/Li⁺[1].

References:

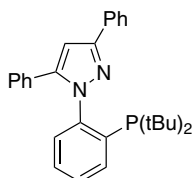
1. *Energy Environ. Sci.*, **2011**, *4*, 2858

PHOSPHORUS (Compounds)

15-1720

NEW

1-(2-Di-*t*-butylphosphinophenyl)-3,5-diphenyl-1H-pyrazole, 98% (628333-86-8)
 $C_{29}H_{33}N_2P$; FW: 440.56; white xtl.; m.p. 138-142°
air sensitive

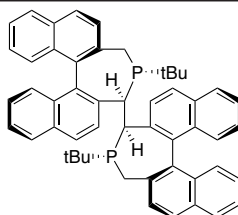


250mg
1g

15-1053

NEW

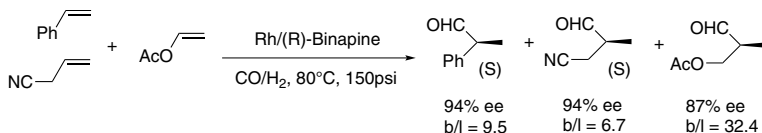
(3S,3'S,4S,4'S,11bS,11'bS)-(+)-4,4'-Di-*t*-butyl-4,4',5,5'-tetrahydro-3,3'-bi-3H-dinaphtho[2,1-c:1',2'-e]phosphepin, 97% (S)-BINAPINE (610304-81-9)
 $C_{52}H_{48}P_2$; FW: 734.89; white to light yellow powdr.
air sensitive
 Note: Sold in collaboration with Chiral Quest for research purposes only. US Patent No. 7105702, 7153809, 7169953.



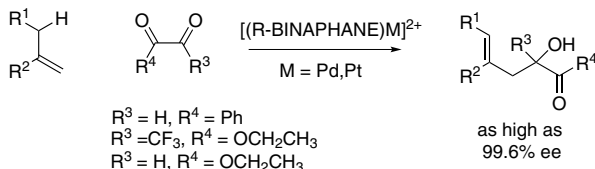
50mg
250mg

Technical Notes:

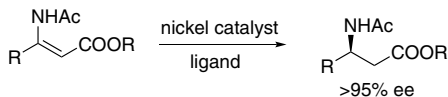
1. Rhodium complex used in asymmetric hydroformylation reactions.
2. Ligand-palladium complex used in enantioselective carbonyl-ene reactions.
3. Nickel-catalyzed asymmetric transfer hydrogenation of olefins for the synthesis of α - and β -amino acids.
4. Nickel-catalyzed asymmetric transfer hydrogenation of hydrazones and other ketimines.
5. Nickel/ligand catalyst used in the enantioselective reductive amination of ketones with both arylamines and benzhydrazide,
6. Rh-Binapine and Pd-Binapine complexes form excellent catalysts for asymmetric (transfer) hydrogenation of aryl substituted olefins to form β -amino acids.



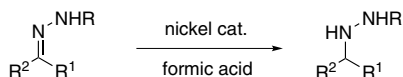
**Tech. Note (1)
Ref. (1)**



**Tech. Note (2)
Ref. (2)**

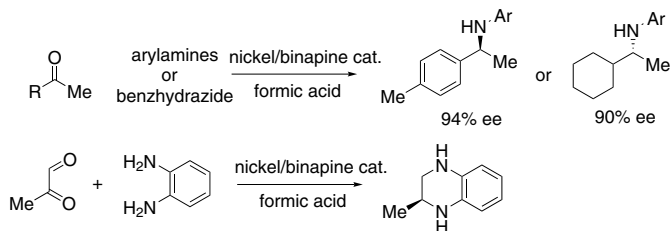


**Tech. Note (3)
Ref. (3)**



**Tech. Note (4)
Ref. (4)**

PHOSPHORUS (Compounds)

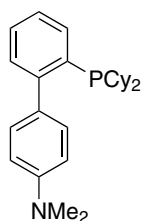


Tech. Note (5)
Ref. (5)

References:

1. *Organometallics.*, **2006**, 25, 5003.
2. *Adv. Synth. Catal.*, **2010**, 352, 1356.
3. *Angew. Chem. Int. Ed.*, **2014**, 53, 12210.
4. *Angew. Chem. Int. Ed.*, **2015**, 54, 5112.
5. *Angew. Chem. Int. Ed.*, **2016**, 55, 12083.

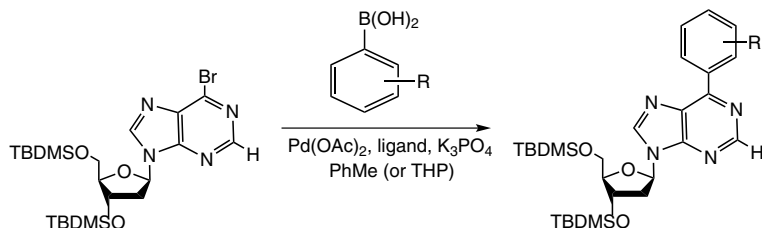
15-1154 **2-Dicyclohexylphosphino-4'-(N,N-dimethylamino)-1,1'-biphenyl, 98% (1185899-00-6)**
NEW $\text{C}_{26}\text{H}_{36}\text{NP}$; FW: 393.55; white xtl.
 Note: Patents: US 6,395,916, US 6,307,087.



250mg
1g
5g

Technical Note:

1. Ligand used in the palladium-catalyzed C-C bond formation in a substituted deoxyguanosine..

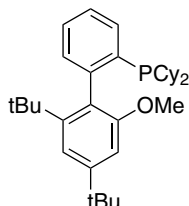


Tech. Note (1)
Ref. (1)

References:

1. *J. Am. Chem. Soc.*, **2009**, 131, 12240.

15-1105 **2-Dicyclohexylphosphino-2'-methoxy-4',6'-di-*t*-butyl-1,1'-biphenyl, min. 98% VPhos (1848244-75-6)**
NEW $\text{C}_{33}\text{H}_{48}\text{OP}$; FW: 492.72; white to off-white solid
 Note: Patents: US 6,395,916, US 6,307,087

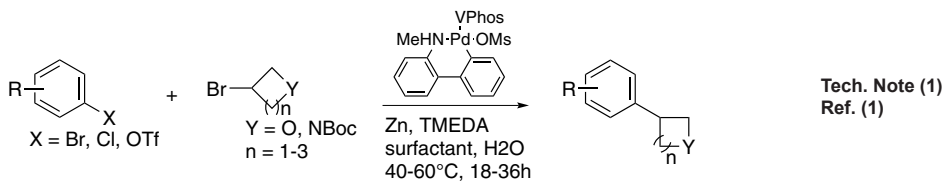


250mg
1g
5g

Technical Note:

1. Ligand for the palladium catalyzed aqueous Lipshutz-Negishi cross-coupling of alkyl halides with aryl electrophiles.

PHOSPHORUS (Compounds)



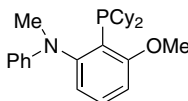
References:

1. *Angew. Chem. Int. Ed.*, **2016**, 55, 1849

15-6528

NEW

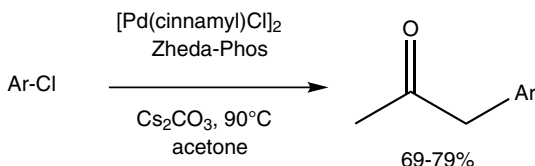
[2-Dicyclohexylphosphino-3-methoxy-N-methyl-N-phenylbenzenamine, 98% Zheda-Phos (1398565-95-1)
 $C_{26}H_{36}NOP$; FW: 409.54; white powdr.; m.p. 169-170°
 Note: Sold under license from ZJU for research purposes only. Patent CN201210146220.6, PCT/CN2012/078129.



250mg
1g

Technical Note:

1. Ligand/Pd catalyst used in the general α -monoarylation of acetone with aryl chlorides.



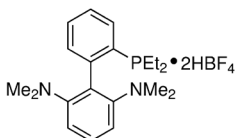
References:

1. *Adv. Synth. Catal.*, **2013**, 355, 1255.

15-1151

NEW

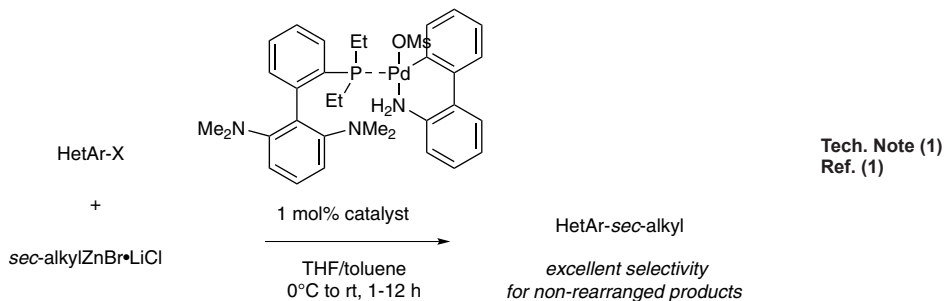
2-Diethylphosphino-2',6'-bis(dimethylamino)-1,1'-biphenyl di(hydrogen tetrafluoroborate) salt, min. 98% EtCPhos
 $C_{20}H_{28}N_2P_2 \cdot 2(HBF_4)$; FW: 504.01; white powdr.
 Note: Patents: US 6,395,916, US 6,307,087.



100mg
500mg

Technical Note:

1. Ligand used in palladium-catalyzed cross-coupling of secondary alkylzinc reagents with heteroaryl halides



References:

1. *Org. Lett.*, **2014**, 16, 4638 (Note this reference is for 46-0348, EtCPhos Palladacycle Gen. 3.)

PHOSPHORUS (Compounds)

15-1372

NEW

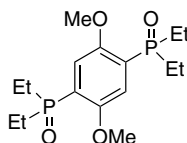
(2,5-Dimethoxy-1,4-phenylene)bis(diethylphosphine oxide), 99+% Redox shuttle

ANL-RS51 (1802015-49-1)

C₁₆H₂₈O₄P₂; FW: 346.34; white solid

air sensitive, moisture sensitive

Note: U.S. Patent: 14/171,556



500mg

2g

Redox Shuttles for Lithium Ion Batteries

1. Provides a long term intrinsic overcharge protection of lithium-ion batteries.
2. Maintains the safe operation of lithium-ion batteries.
3. Highly-soluble in conventional non-aqueous, carbonate based electrolytes.
4. Increases battery long-term stability and oxidation potential.

Electrochemical Properties

1. ANL-RS51 exhibits a reversible redox potential of about 4.6V vs Li/Li⁺ (1.2 M LiPF₆ in 3:7 wt/wt mixture of ethylene carbonate and ethyl methyl carbonate).

References:

1. US 20150221982 A1 6, Aug, 2015

15-1365

NEW

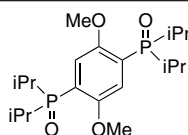
(2,5-Dimethoxy-1,4-phenylene)bis(di-i-propylphosphine oxide), 99+% Redox shuttle

ANL-RS5 (1426397-81-0)

C₂₀H₃₆O₄P₂; FW: 402.45; white powder

air sensitive, moisture sensitive

Note: U.S. Patent: 14/171,556



250mg

1g

Redox Shuttles for Lithium Ion Batteries

1. Provides a long term intrinsic overcharge protection of lithium-ion batteries.
2. Maintains the safe operation of lithium-ion batteries.
3. Highly-soluble in conventional non-aqueous, carbonate based electrolytes.
4. Increases battery long-term stability and oxidation potential.

Electrochemical Properties:

1. ANL-RS5 (abbreviated BPDB) exhibits a reversible redox potential of about 4.5V vs Li/Li⁺ (1.2 M LiPF₆ in 3:7 wt/wt mixture of ethylene carbonate and ethyl methyl carbonate) [1]
2. Provides stable overcharge protection for 4V MCMB (mesocarbon microbead)/LMO (LiMn₂O₄) cells delivering 95 cycles of 100% overcharge at room temperature [1]

References:

1. J. Mater. Chem., A, 2015, 3, 10710.

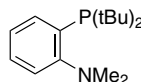
15-1260

NEW

[2-(N,N-Dimethylamino)phenyl]di-t-butylphosphine, min. 95% (415941-58-1)

C₁₆H₂₈NP; FW: 265.37; white to light-brown xtl.; m.p. 50-53°

Note: Ligand used in the copper-catalyzed coupling of arylboronate esters with aryl and heteroaryl halides.

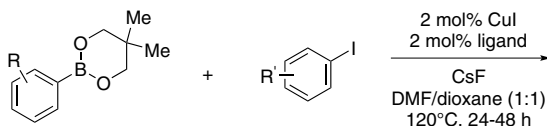


1g

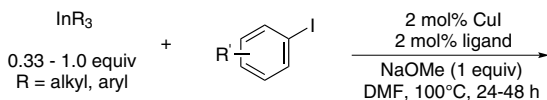
5g

Technical Notes:

1. Ligand for the Copper-Catalyzed Suzuki-Miyaura Coupling of Arylboronate Esters and Aryl Iodides
2. Ligand for the Copper-Catalyzed Coupling of Triaryl- and Trialkylindium reagents with Aryl Iodides and Bromides



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

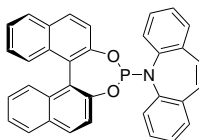
1. Org. Lett., 2014, 16, 1264
2. Angew. Chem. Int. Ed., 2014, 53, 11620

PHOSPHORUS (Compounds)

15-1227

NEW

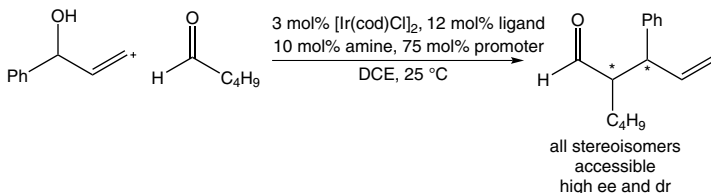
(S)-(+)-(3,5-Dioxa-4-phosphacyclohepta[2,1-a;3,4-a']dinaphthalen-4-yl)-5H-dibenz[b,f]azepine, min. 97% (942939-38-0)
 $C_{34}H_{22}NO_2P$; FW: 507.52; yellow solid
air sensitive, moisture sensitive



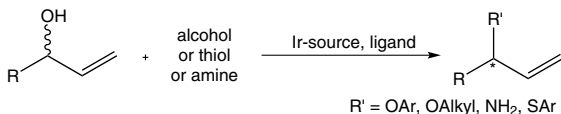
100mg
500mg

Technical Notes:

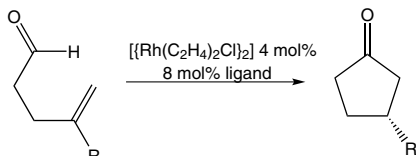
1. The ligand is used in the stereodivergent α -allylation of linear aldehydes with dual iridium and amine catalysis.
2. The ligand is used in the direct, enantioselective iridium-catalyzed amination and (thio-) etherification of racemic allylic alcohols.
3. The ligand is used in an asymmetric, rhodium-catalyzed, intramolecular hydroacylation reaction.



Tech. Note (1)
Ref. (1,2)



Tech. Note (2)
Ref. (3,4,5)



Tech. Note (3)
Ref. (6)

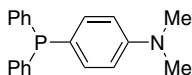
References:

1. *J. Am. Chem. Soc.*, **2014**, 136, 3020.
2. *Science*, **2013**, 340, 1065.
3. *Angew. Chem. Int. Ed.*, **2012**, 51, 3470.
4. *Angew. Chem. Int. Ed.*, **2012**, 51, 8652.
5. *Angew. Chem. Int. Ed.*, **2011**, 50, 5568.
6. *Angew. Chem. Int. Ed.*, **2011**, 50, 10670.

15-1380

NEW

Diphenyl[4-(N,N-dimethylamino)phenyl]phosphine, min. 95% (739-58-2)
 $C_{20}H_{20}NP$; FW: 305.35; white solid;
 m.p. 151-154°
air sensitive

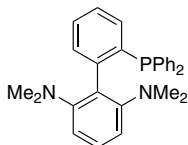


1g
5g

15-1125

NEW

2-Diphenylphosphino-2',6'-bis(dimethylamino)-1,1'-biphenyl, min. 98% PhCPhos
 (1447963-71-4)
 $C_{28}H_{29}N_2P_2$; FW: 424.52; tan solid
 Note: Patents: US 6,395,916, US 6,307,087

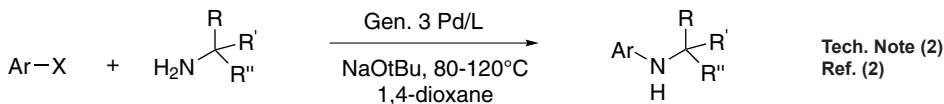
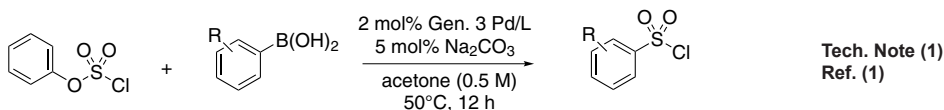


100mg
500mg

Technical Notes:

1. Ligand for the Palladium catalyzed chlorosulfonylation of aryl boronic acids
2. Ligand for the Palladium-catalyzed Buchwald-Hartwig cross-coupling of hindered primary amines and aryl halides

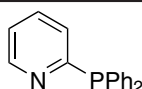
PHOSPHORUS (Compounds)



References:

1. *J. Am. Chem. Soc.*, **2013**, 135, 10638
2. *J. Am. Chem. Soc.*, **2015**, 137, 3085

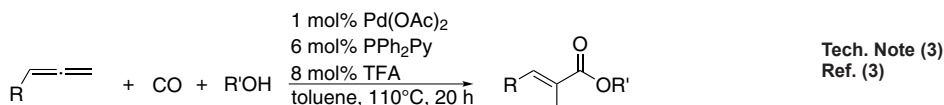
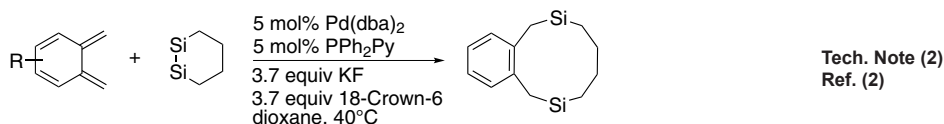
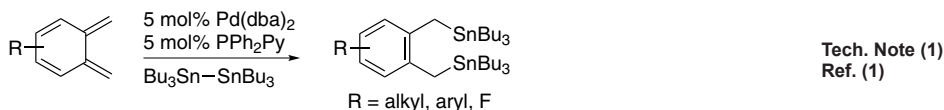
15-1780 **2-Diphenylphosphinopyridine, min. 97%**
(37943-90-1)
C₁₇H₁₄NP; FW: 263.27; white to off-white solid



5g
25g

Technical Notes:

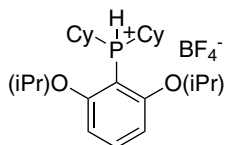
1. Ligand for the palladium-catalyzed distannylation of ortho-quinodimethanes
2. Ligand for the palladium-catalyzed disilylation of o-quinodimethanes to synthesize 9- and 10-membered disilacarbocycles
3. Ligand for the palladium-catalyzed alkoxy carbonylation of allenes



References:

1. *Org. Lett.*, **2006**, 8, 4157
2. *Org. Lett.*, **2008**, 10, 4319
3. *J. Am. Chem. Soc.*, **2015**, 137, 8556

15-6525 **[2,6-Di-i-propoxyphenyl]dicyclohexylphosphonium tetrafluoroborate, 98% GorlosPhosHBF₄ (1268824-70-9)**
C₂₄H₄₀BF₄O₂P; FW: 478.35; white solid;
m.p. 221.6-223.2°
Note: Sold under license from ZJU for research purposes only. Patents ZL200910154029.4, PCT/CN2009/001527.

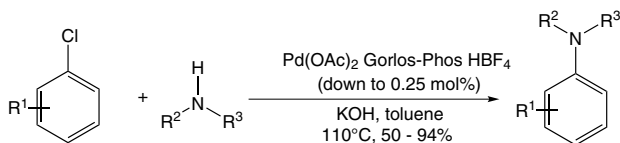


500mg
2g

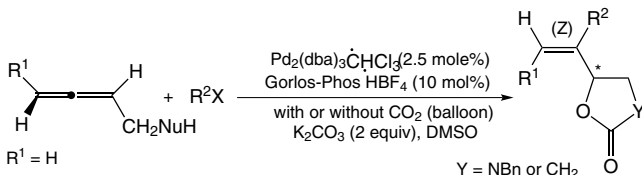
Technical Notes:

1. A new ligand for the palladium-catalyzed amination reactions of aryl chlorides with potassium hydroxide as the base.
2. A new ligand for the palladium-catalyzed exo-mode cyclization of allenes with a nucleophilic functionality.

PHOSPHORUS (Compounds)



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

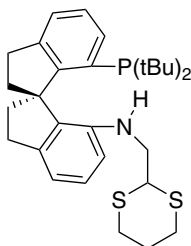
References:

1. *Adv. Synth. Catal.*, **2011**, 353, 100.
2. *Org. Biomol. Chem.*, **2013**, 11, 5370.

15-1638

NEW

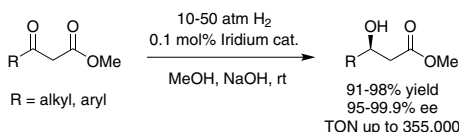
(R)-(+)-7-[N-(1,3-Dithian-2-yl)methylamino]-7'-[bis(3,5-di-*t*-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-DTB-SpiroSAP] (1809609-53-7)
C₅₀H₆₆NPS₂; FW: 776.17; white to off-white solid; m.p. 95-97°
air sensitive



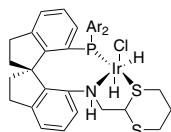
25mg
100mg

Technical Note:

1. Chiral P-N-S Spiro Ligand used in the Iridium-catalyzed asymmetric Hydrogenation of Ketoesters



R = alkyl, aryl



Iridium catalyst (77-2150)

Tech. Note (1)
Ref. (1)

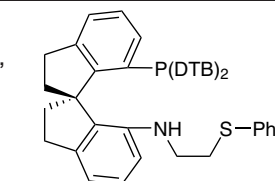
References:

1. *Angew. Chem. Int. Ed.* **2015**, 54, 8791

15-1639

NEW

(S)-(-)-7-[N-(1,3-Dithian-2-yl)methylamino]-7'-[bis(3,5-di-*t*-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(S)-DTB-SpiroSAP]
C₅₀H₆₆NPS₂; FW: 776.17; white to off-white solid; m.p. 95-97°
air sensitive



25mg
100mg

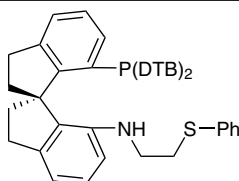
Technical Note:

1. See 15-1638 (page 108)

15-1605

NEW

(R)-(+)-7-[N-(2-Phenylthio)ethylamino]-7'-[bis(3,5-di-*t*-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-DTB-SpiroSAP-Ph] (1809609-38-8)
C₅₃H₆₆NPS₂; FW: 780.14; off-white solid; m.p. 58-60°
air sensitive



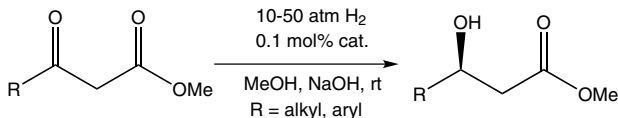
25mg
100mg

PHOSPHORUS (Compounds)

This technical note is for the iridium complex 77-2510. This is an analogous ligand included in the reference below.

Technical Note:

- Catalyst used for the asymmetric hydrogenation of β -alkyl- β -ketoesters.



Tech. Note (1)
Ref. (1)

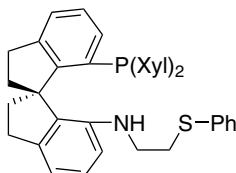
References:

- Angew. Chem. Int. Ed., 2015, 54, 8791

15-1645

NEW

(R)-(+)-7-[N-(2-Phenylthio)ethylamino]-7'-[bis(3,5-dimethylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-Xyl-SpiroSAP-Ph] (1809609-39-9)
C₂₄H₄₂NPS; FW: 611.82; off-white solid;
m.p. 58-60°
air sensitive



25mg
100mg

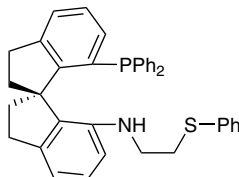
Technical Note:

- See 15-1605 (page 108)

15-1643

NEW

(R)-(+)-7-[N-(2-Phenylthio)ethylamino]-7'-[diphenylphosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane, 97+% (>99% ee) [(R)-Ph-SpiroSAP-Ph] (1809609-40-2)
C₂₇H₃₄NPS; FW: 555.71; off-white solid;
m.p. 55-58°
air sensitive



25mg
100mg

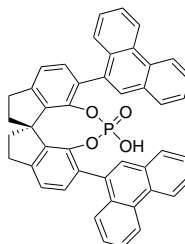
Technical Note:

- See 15-1605 (page 108)

15-1363

NEW

(11aR)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-9-phenanthrenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1372719-93-1)
C₄₅H₃₁O₄P; FW: 666.70; white to light-yellow powdr.
Note: Sold in collaboration with Daicel for research purposes only.

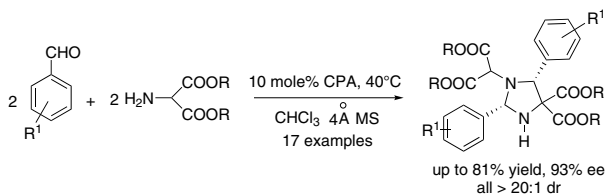


25mg
100mg

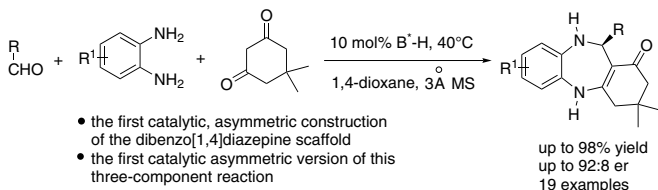
Technical Notes:

- Catalytic asymmetric homo-1,3-dipolar cycloadditions of azomethine ylides: diastereo and enantioselective synthesis of imidazolidines.
- Enantioselective construction of the biologically significant dibenzo[1,4]diazepine scaffold via organocatalytic asymmetric three-component reactions.
- Enantioselective construction of the biologically important cyclopenta[1,4]diazepine framework enabled by asymmetric catalysis by chiral spiro-phosphoric acid.
- Triply hydrogen-bond-directed enantioselective assembly of pyrrolobenzo-1,4-diazine skeletons with quaternary stereocenters.

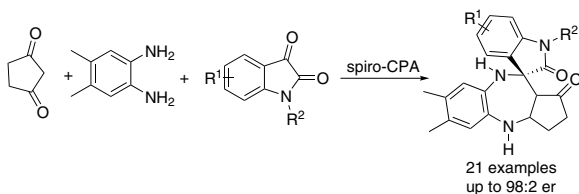
PHOSPHORUS (Compounds)



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)

References:

1. *Tetrahedron Asymmetry*, **2014**, 25, 617.
2. *Adv. Synth. Catal.*, **2009**, 356, 2009.
3. *Eur. J. Org. Chem.*, **2015**, 2015, 7926.
4. *Chem-Eur. J.*, **2015**, 21, 9039.

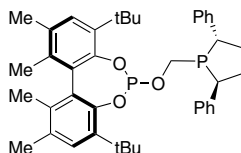
15-1364 (11aS)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-9-phenanthrenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%
NEW (1585988-92-6)
C₄₅H₃₁O₄P; FW: 666.70; white to light-yellow powdr.
Note: Sold in collaboration with Daicel for research purposes only.

25mg
100mg

Technical Note:

1. See 15-1363 (page 109)

15-0557 (11aS)-1,2,10,11-Tetramethyl-4,8-bis(t-butyl)-6-[[[(2S,5S)-(2,5-diphenyl-1-phospholanyl) methoxy]-dibenzo[d,f][1,3,2]dioxaphosphepin] S_{ax}S,S-BOBPHOS
NEW (1373349-83-7)
C₄₁H₅₀O₃P₂; FW: 652.78; white microxtl. powdr.
moisture sensitive

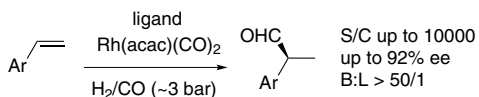


100mg
500mg

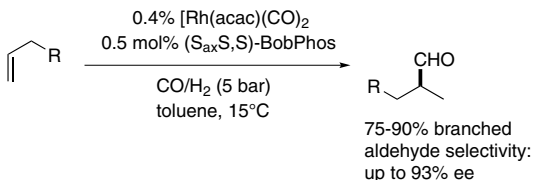
Technical Notes:

1. Rhodium/phospholane catalysts for the unusually high regioselectivity in the enantioselective hydroformylation of vinyl arenes.
2. An asymmetric hydroformylation catalyst that delivers branched aldehydes from alkyl alkenes

PHOSPHORUS (Compounds)



Tech. Note (1)
Ref. (1)

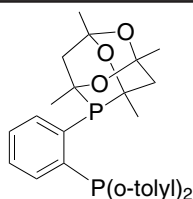


Tech. Note (2)
Ref. (2)

References:

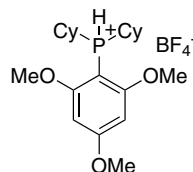
1. *Chem Commun.*, **2014**, 50, 1475.
2. *Angew. Chem. Int. Ed.*, **2012**, 51, 2477.

15-1099
NEW
1,3,5,7-Tetramethyl-8-(2-di-o-tolylphosphino-phenyl)-2,4,6-trioxa-8-phosphaadamantane
PAd-DalPhos (1902911-38-9)
 $\text{C}_{30}\text{H}_{34}\text{O}_3\text{P}_2$; FW: 504.54; white powdr.
air sensitive, moisture sensitive



250mg
1g

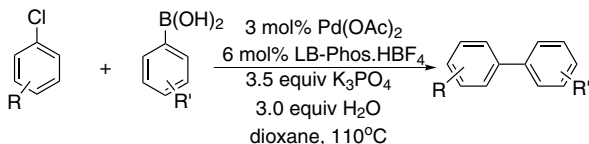
15-6520
NEW
[2,4,6-Trimethoxyphenyl]dicyclohexyl-phosphonium tetrafluoroborate, 98%
LB-PhosHBF₄ (1217887-12-1)
 $\text{C}_{21}\text{H}_{34}\text{BF}_4\text{O}_3\text{P}$; FW: 452.27; white solid;
 m.p. 142.6-143.4°
 Note: Sold under license from ZJU for research
 purposes only. Patents ZL200910154029.4,
 PCT/CN2009/001527



500mg
2g

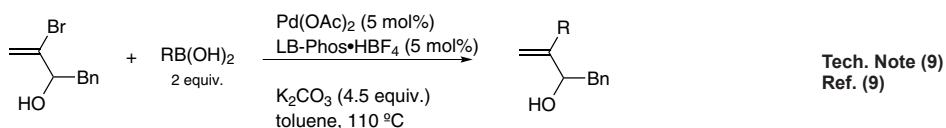
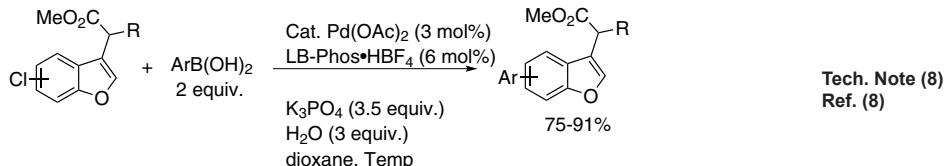
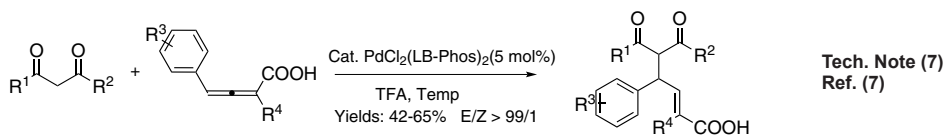
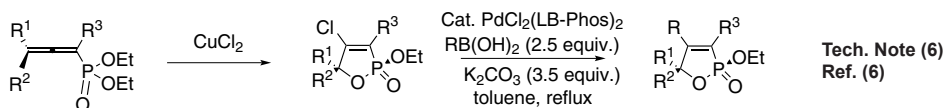
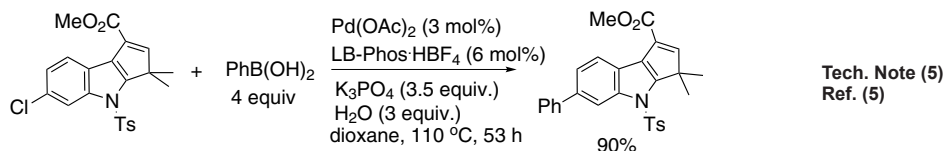
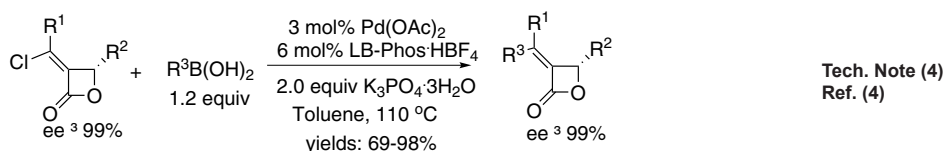
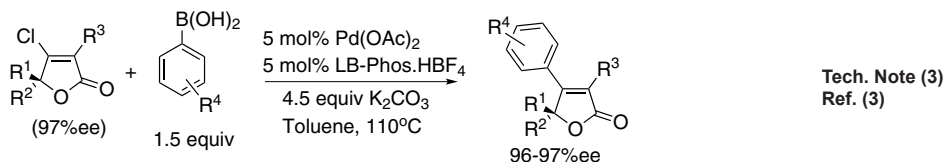
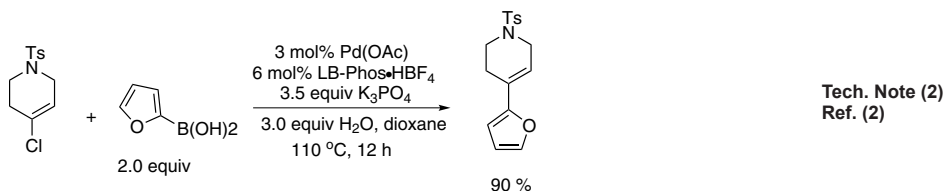
Technical Notes:

1. Suzuki-coupling reaction of aryl or 1-alkenyl chlorides.
2. Suzuki-coupling reactions of substituted furans.
3. Highly selective Suzuki-coupling of C-Cl bonds in β -chlorobutenelides.
4. Palladium-catalyzed Suzuki-coupling reactions of chloroalkylidene- β -lactones.
5. Suzuki-coupling reactions of chloro-substituted cyclopentadienylindoles.
6. Efficient synthesis of 4-halo-2,5-dihydro-1,2-oxaphosphate-2-oxides from 1,2-allenylphosphates.
7. Palladium-catalyzed reaction of 2,3-allenoates with a 1,3-diketone.
8. Suzuki-coupling of chloro-substituted benzofurans with arylboronic acids.
9. Suzuki-coupling of 2-bromoalken-3-ols with alkylboronic acids.
10. Copper-catalyzed hydroboration of alkynamides with B_2pin_2 .

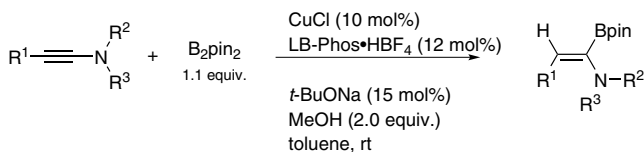


Tech. Note (1)
Ref. (1)

PHOSPHORUS (Compounds)



PHOSPHORUS (Compounds)

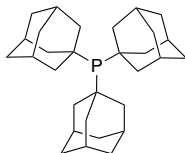


Tech. Note (10)
Ref. (10)

References:

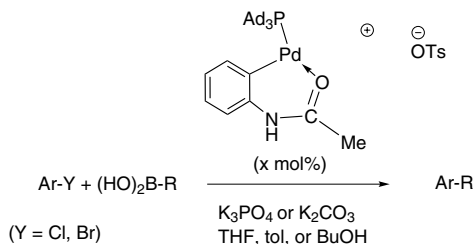
1. *Tetrahedron Lett.*, **2010**, 51, 1284.
2. *Chem. Commun.*, **2012**, 48, 12074.
3. *Chem. Eur. J.*, **2010**, 16, 6434.
4. *Org. Biomol. Chem.*, **2013**, 11, 98.
5. *Org. Lett.*, **2012**, 14, 3616.
6. *Eur. J. Org. Chem.*, **2012**, 3806.
7. *Eur. J. Org. Chem.*, **2012**, 2585.
8. *Org. Lett.*, **2012**, 14, 720.
9. *Eur. J. Org. Chem.*, **2012**, 4034.
10. *Org. Biomol. Chem.*, **2014**, 12, 5945.

15-6558	Trimethylphosphite, 99% (121-45-9)	50g
NEW	(CH ₃ O) ₃ P; FW: 124.08; colorless liq.; b.p. 110-112°; f.p. 82°F; d. 1.052	250g
HAZ	<i>air sensitive</i>	
15-0935	Tris(1-adamantyl)phosphine, 97%	250mg
NEW	(897665-73-5)	1g
	C ₃₀ H ₄₅ P; FW: 436.65; white to off-white powdr.	5g
	<i>air sensitive</i>	
	Note: Sold in collaboration with GreenCentre for research purposes only. Patents: 62248056.	



Technical Note:

1. A stable phosphine ligand which can bind to metals such as palladium to be used in Suzuki-Miyaura couplings in making drug intermediates. Dramatic effects in catalysis are also accessible now by using PdAd3 as a ligand during Suzuki-Miyaura cross-coupling of chloro(hetero)arenes.^{1,2}

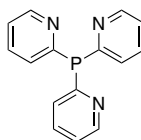


Tech. Note (1)
Ref. (1,2)

References:

1. *Synlett.*, **2017**, 28(3), 280-288.
2. *J. Am. Chem. Soc.*, **2016**, 138, 6392.

15-7725	Tris(2,6-dimethoxyphenyl)phosphine, min. 97% (85417-41-0)	5g
NEW	C ₂₄ H ₂₇ O ₆ P; white to off-white powdr.; m.p. 145-147°	
	<i>air sensitive</i>	
15-7945	Tris(2-pyridyl)phosphine, min. 97% (26437-48-9)	250mg
NEW	(C ₅ H ₄ N) ₃ P; FW: 265.25; white to off-white powdr.; m.p. 112-114°	1g
	<i>air sensitive</i>	



PLATINUM (Elemental Forms)

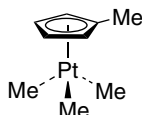
78-3015 NEW	Platinum nanoparticles, 1% on carbon black (surfactant and reactant-free) (7440-06-4) Pt; FW: 195.10; black solid (store cold) Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.	5g 25g
78-3020 NEW	Platinum nanoparticles, 5% on carbon black (surfactant and reactant-free) (7440-06-4) Pt; FW: 195.10; black solid (store cold) Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.	5g 25g
78-3030 NEW	Platinum nanoparticles, 10% on carbon black (surfactant and reactant-free) (7440-06-4) Pt; FW: 195.10; black solid (store cold) Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.	1g 5g
78-3032 NEW	Platinum nanoparticles, 20% on carbon black (surfactant and reactant-free) (7440-06-4) Pt; FW: 195.10; black solid (store cold) Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.	1g 5g
78-3035 NEW	Platinum nanoparticles, 30% on carbon black (surfactant and reactant-free) (7440-06-4) Pt; FW: 195.10; black solid (store cold) Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.	1g 5g
78-3012 NEW	Platinum nanoparticles, 1% on Titania (anatase) (surfactant and reactant-free) (7440-06-4) Pt; FW: 195.10; gray solid (store cold) Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.	5g 25g
78-3005 NEW	Platinum nanoparticles, 1% on Titania (rutile) (surfactant and reactant-free) (7440-06-4) Pt; FW: 195.10; light gray solid (store cold) Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.	5g 25g
78-3026 NEW	Platinum nanoparticles, 10% on Titania (anatase) (surfactant and reactant-free) (7440-06-4) Pt; FW: 195.10; dark gray solid (store cold) Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.	1g 5g
78-3023 NEW	Platinum nanoparticles, 10% on Titania (rutile) (surfactant and reactant-free) (7440-06-4) Pt; FW: 195.10; dark gray solid (store cold) Note: Manufactured by laser ablation. Sold in collaboration with Particular® for research purposes only.	1g 5g

PLATINUM (Compounds)

98-1350

NEW

(Trimethyl)methylcyclopentadienylplatinum(IV),
99% (99.999%-Pt) PURATREM (94442-22-5)
(CH₃)₃(CH₃C₅H₄)Pt; FW: 319.32; off-white powdr.;
m.p. 30-31°; b.p. (subl. 23°C/0.053mm); d. 1.88
air sensitive, (store cold)



500mg
2g
10g

POTASSIUM (Compounds)

19-5395

NEW

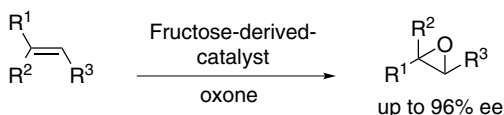
Potassium monoperoxysulfate OXONE® (70693-62-8)
2KHSO₅·KHSO₄·K₂SO₄; FW: 307.37; white solid

25g
100g

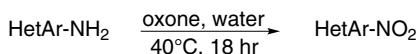
HAZ

Technical Notes:

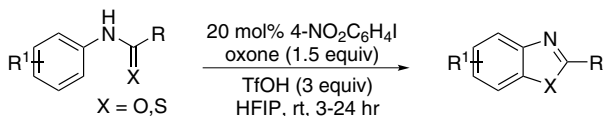
1. Reagent for the catalytic asymmetric Shi epoxidation
2. Reagent for the synthesis of nitro heteroaromatics in water
3. Reagent for the syntheses of benzoxazoles and benzothiazoles using aryl iodides via C-H functionalization and C-O/S bond formation
4. Reagent used for bromolactonization in the asymmetric total synthesis of (+)-Dubiusamine C
5. Reagent for the benzofuran oxidative dearomatization cascade in the total synthesis of Integrastatin B



Tech. Note (1)
Ref. (1,2,3,4,5,6)



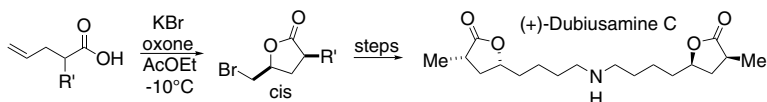
Tech. Note (2)
Ref. (7)



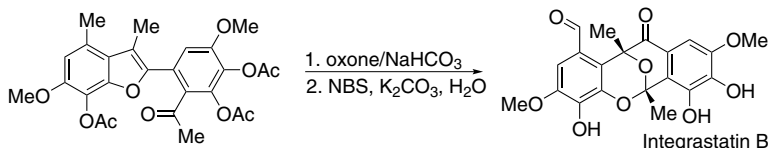
Tech. Note (3)
Ref. (8)

R¹ = EWG, EDG

R = aryl, alkyl



Tech. Note (4)
Ref. (9)



Tech. Note (5)
Ref. (10)

References:

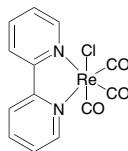
1. *J. Am. Chem. Soc.*, **1997**, 119, 11224.
2. *J. Org. Chem.*, **2006**, 71, 1715.
3. *J. Org. Chem.*, **2007**, 72, 4093.
4. *J. Org. Chem.*, **2008**, 73, 9539.
5. *Org. Lett.*, **2009**, 11, 5150.
6. *J. Org. Chem.*, **2009**, 74, 6335.
7. *Org. Process Res. Dev.*, **2014**, 18, 886.
8. *J. Org. Chem.*, **2014**, 79, 7502.
9. *J. Org. Chem.*, **2015**, 80, 9132.
10. *Org. Lett.*, **2016**, 18, 1458.

RHENIUM (Compounds)

75-2360

NEW

Chlorotricarbonyl(2,2'-bipyridine)rhenium(I), 99% (55658-96-3)
 $C_{13}H_8ClN_2O_3Re$; yellow solid



250mg
1g

Technical Note:

1. This catalyst is used for the reduction of carbon dioxide and carbonyls (Ref. 1-6).

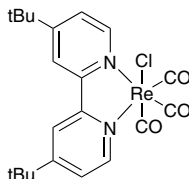
References:

1. *ACS Catal.*, **2015**, 5, 900
2. *J. Phys. Chem. Lett.*, **2014**, 5, 2033
3. *Inorg. Chem.*, **2014**, 53, 2606
4. *J. Am. Chem. Soc.*, **2013**, 135, 1823
5. *Dalton Trans.*, **2013**, 42, 2062
6. *Chem. Eur. J.*, **2012**, 18, 15722

75-2365

NEW

Chlorotricarbonyl(4,4'-di-t-butyl-2,2'-bipyridine) rhenium(I), 99% (165612-19-1)
 $C_{21}H_{24}ClN_2O_3Re$; FW: 574.09; yellow solid



250mg
1g

Technical Note:

1. This catalyst is used for the reduction of carbon dioxide.

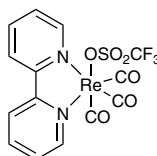
References:

1. *J. Phys. Chem. A*, **2015**, 119, 959.
2. *Proceedings of the National Academy of Sciences of the United States of America*, **2014**, 111, 9745.
3. *Polyhedron*, **2013**, 58, 229
4. *Inorg. Chem.*, **2010**, 49, 9283

75-2385

NEW

Trifluoromethylsulfonatotricarbonyl(2,2'-bipyridine) rhenium(I), 99% (97170-94-0)
 $C_{14}H_8F_3N_2O_6ReS$; FW: 575.49; light yellow powder.



100mg
500mg

RHODIUM (Compounds)

45-0655

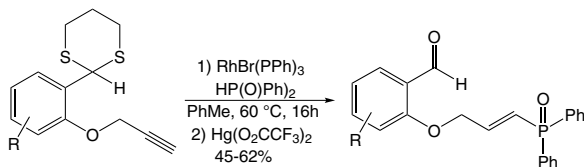
NEW

Bromotris(triphenylphosphine)rhodium(I), 99% (99.9%-Rh) (14973-89-8)
 $C_{54}H_{45}BrP_3Rh$; FW: 969.67

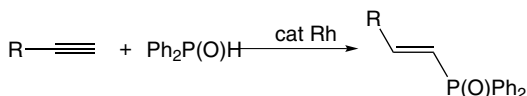
250mg
1g
5g

Technical Notes:

1. Rhodium-catalyzed regio- and stereoselective addition of diphenylphosphine oxide to alkynes.
2. Rhodium-catalyzed hydrophosphinylation.



Tech. Note (1)
Ref. (1)



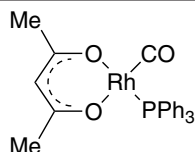
Tech. Note (2)
Ref. (2)

RHODIUM (Compounds)

References:

1. *Org. Lett.*, **2008**, *10*, 3141
2. *J. Org. Chem.*, **2001**, *66*, 5929

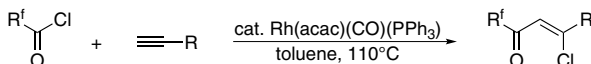
45-0355 **NEW** Carbonyl(acetylacetonato)(triphenylphosphine)rhodium(I), **99%** (25470-96-6)
 $C_{24}H_{22}O_3PRh$; FW: 492.31; yellow solid



250mg
1g
5g

Technical Note:

1. Rhodium catalyzed addition of fluorinated acid chlorides to alkynes

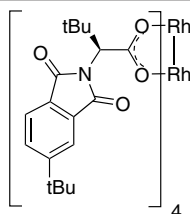


Tech. Note (1)
Ref. (1)

References:

1. *Org. Lett.*, **2005**, *7*, 2241.

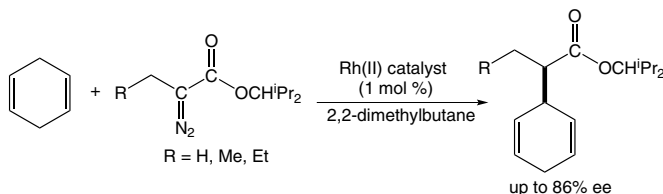
45-2105 **NEW** Tetrakis[5-*t*-butyl-phthaloyl-N-(*S*)-tert-leucinato]dirhodium bis(ethyl acetate) adduct **Rh2(S-tertPTTL)4** (1884452-99-6)
 $C_{72}H_{88}N_4O_{16}Rh_2$; FW: 1471.30; green powder.
 Note: Sold for research and development purposes only. Patent 2014. 2014903620.



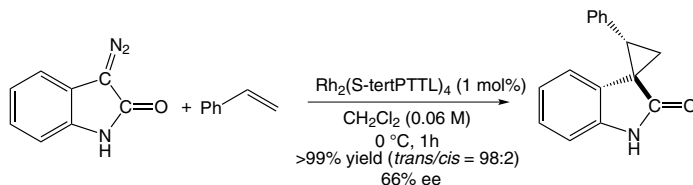
50mg
250mg

Technical Notes:

1. Catalyst used for the asymmetric, intermolecular C-H insertion of 1,4-cyclohexadiene with α -alkyl- α -diazoesters.
2. Catalyst used for a catalytic cyclopropanation using diazooxindole..
3. Catalyst used for the asymmetric, intramolecular C-H insertion of sulfonyldiazoacetates.
4. Catalyst used for the enantioselective synthesis of 2-aryl-bicyclo[1.1.0]butane carboxylates.
5. Access to the [3.2.2] nonatriene structural frameworks via an intramolecular cyclopropanation/ Buchner reaction/Cope rearrangement cascade.
6. Catalyst used for the cyclopropanation of styrene with dimethyl- α -diazobenzylphosphonate.

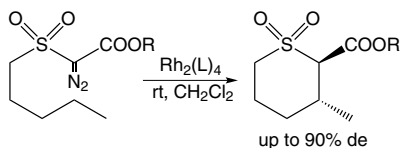


Tech. Note (1)
Ref. (1)

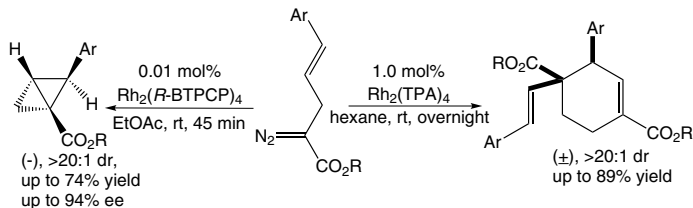


Tech. Note (2)
Ref. (2)

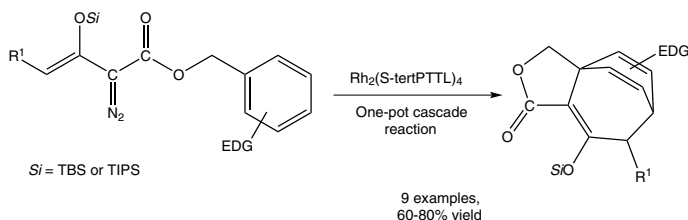
RHODIUM (Compounds)



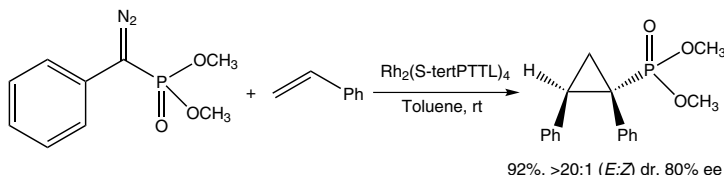
Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)



Tech. Note (5)
Ref. (5)



Tech. Note (6)
Ref. (6)

References:

1. *Heterocycles*, **2012**, 86, 1647
2. *SynLett*, **2013**, 24, 29
3. *Tetrahedron-Asymmetry*, **2013**, 24, 151
4. *Org. Lett.*, **2013**, 15, 310
5. *Org. Lett.*, **2015**, 17, 790
6. *Tetrahedron Lett.*, **2016**, 57, 852

RUTHENIUM (Compounds)

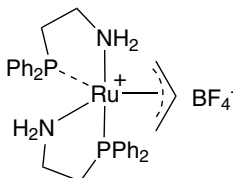
44-6085

NEW

Allylbis(2-aminoethyldiphenylphosphino)ruthenium(II) tetrafluoroborate, 98% (1352633-94-3)

$\text{C}_{31}\text{H}_{37}\text{BF}_4\text{N}_2\text{P}_2\text{Ru}$; FW: 687.46; off-white to pale yellow solid

Note: Sold in collaboration with GreenCentre for research purposes only. Patents: PCT/2013/010275.

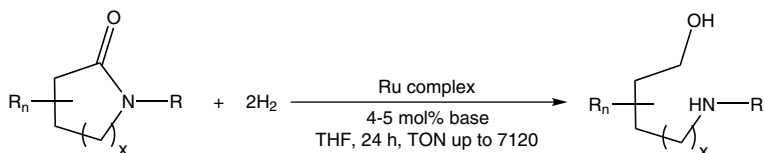


100mg
500mg

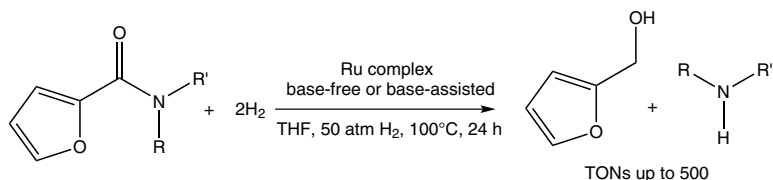
Technical Notes:

1. A highly active catalyst for the hydrogenation of amides to alcohols and amines.
2. Catalyst used for the hydrogenation of functionalized amides under basic and neutral conditions.

RUTHENIUM (Compounds)



Tech. Note (1)
Ref. (1)



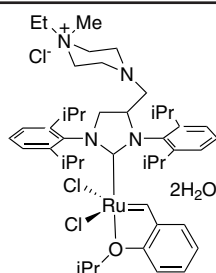
Tech. Note (2)
Ref. (2)

References:

1. *Angew. Chem. Int. Ed.*, **2011**, 50, 10377.
2. *Catal. Sci. Technol.*, **2015**, 5, 1186.

96-0400 Apeiron Ruthenium Metathesis Catalyst Kit See page 36

44-0759 (1,3-Bis(2,6-diisopropylphenyl)-4-((4-ethyl-4-methylpiperzain-1-ium-1-yl)methyl)imidazolidin-2-ylidene)(2-isopropoxybenzylidene) ruthenium(II) chloride dihydrate FixCat (1799947-97-9)
 $\text{C}_{45}\text{H}_{67}\text{Cl}_2\text{N}_4\text{ORuCl}_2 \cdot 2(\text{H}_2\text{O})$; FW: 887.47 (923.50); green powd.
 (store cold)
 Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 61/603,790; PCT/EP2013/053967

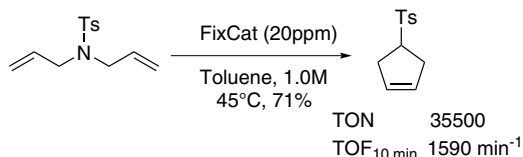


100mg
500mg

Technical Note:

1. Fixcat is a stable olefin metathesis initiator with very good solubility in neat water. The product efficiently promotes ring-closing, cross, and enyne metathesis reactions of water soluble substrates. Suitable for homogeneous and heterogeneous in batch or flow setup.

The Fixcat structure was also optimized to serve as a versatile and very stable catalyst, easily immobilized on solid supports. In its SCA-15 supported version, it showed exceptional efficiency in promoting ring-closing and cross-metathesis reactions, in both batch and continuous flow setups. Fix Cat is also applicable as a homogeneous catalyst, where compatible solvents include alcohols and halogenated solvents.



Tech. Note (1)
Ref. (1)

References:

1. *ChemSus Chem.*, **2015**, 8, 4139.

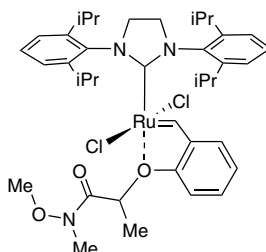
RUTHENIUM (Compounds)

44-0750

NEW

[1,3-Bis(2,6-di-*i*-propylphenyl)imidazolidin-2-ylidene][2-[[1-(methoxy(methyl)amino)-1-oxopropan-2-yl]oxy]benzylidene]ruthenium(II) dichloride
GreenCat (1448663-06-6)

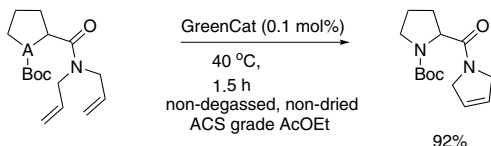
C₃₉H₅₃Cl₂N₃O₃Ru; FW: 783.33; green powdr.
Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 61/666,009, PCT/EP2013/062435. Apeiron Ruthenium Metathesis Catalyst Kit component.



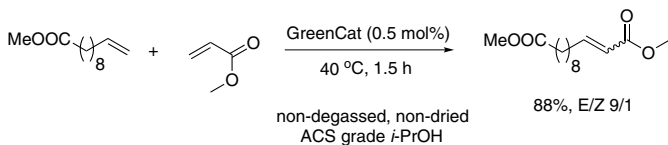
100mg
500mg

Technical Note:

- Efficient, durable and reusable olefin metathesis catalyst with a high affinity to silica gel.



Tech. Note (1)
Ref. (1)



Tech. Note (1)
Ref. (1)

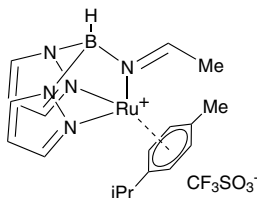
References:

- Tetrahedron*, **2013**, 69, 7408

44-0355

NEW

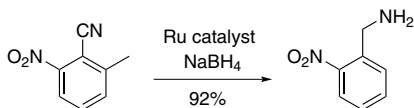
[Bis(pyrazol-1-yl)(acetimino)hydrido-*borato*](*p*-cymene)ruthenium(II) trifluoromethanesulfonate (1607436-49-6)
C₁₉H₂₅BF₃N₅O₃RuS; FW: 572.38; yellow powdr.



100mg
500mg

Technical Note:

- Dual site catalyst for the mild, selective nitrile reduction.



Tech. Note (1)
Ref. (1)

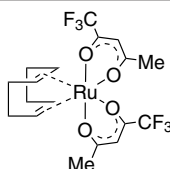
References:

- Chem. Comm.*, **2014**, 50(40), 5391.

44-8165

NEW

Bis(1,1,1-trifluoro-2,4-pentanedionato)(1,5-cyclooctadiene)ruthenium(II), 98% (38704-78-8)
C₁₈H₂₀F₆O₄Ru; FW: 515.41; red-brown low melting solid; b.p. 120-160/1 mm



50mg
250mg

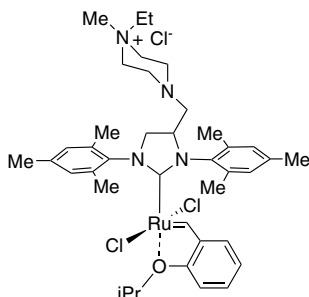
RUTHENIUM (Compounds)

44-0768

NEW

[1,3-Bis(2,4,6-trimethylphenyl)-4-[(4-ethyl-4-methylpiperazin-1-ium-1-yl)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene) dichlororuthenium(II) chloride AquaMet (1414707-08-6)

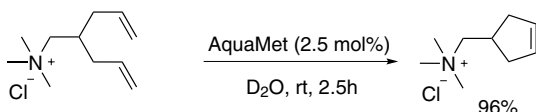
$C_{39}H_{55}Cl_2N_5ORu$; FW: 803.31; green powdr.
Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 61/603,790, PCT/EP2013/053967. Apeiron Ruthenium Metathesis Catalyst Kit component.



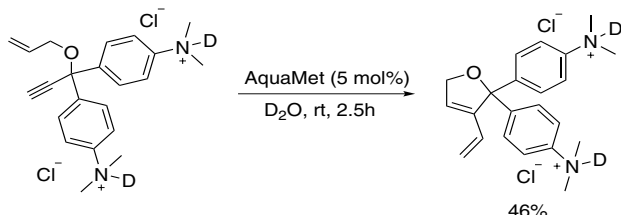
100mg
500mg

Technical Notes:

1. This is an highly active catalyst for olefin metathesis in water.
2. This catalyst is used as linker free heterogeneous metathesis catalysts after immobilization on silica or siliceous mesoporous molecular sieves. TON of ~16000 for the RCM of (-)- β -citronellene are reported. (Ref. 2)



Tech. Note (1)
Ref. (1)



Tech. Note (1)
Ref. (1)

References:

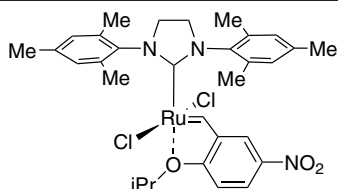
1. *Catal. Sci. Technol.*, **2012**, 22, 2424
2. *ACS Catal.*, **2014**, 4, 3227

44-0758

NEW

[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)]-(2-i-propoxy-5-nitrobenzylidene)ruthenium(II) dichloride nitro-Grela (502964-52-5)

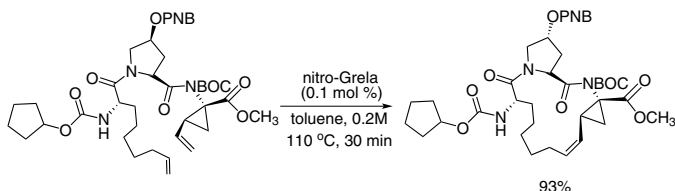
$C_{31}H_{37}Cl_2N_3O_3Ru$; FW: 671.62; green powdr.
Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 6,867,303, PCT/EP2003/01122. Apeiron Ruthenium Metathesis Catalyst Kit component.



100mg
500mg

Technical Notes:

1. This catalyst is used for an efficient synthesis of HCV Protease Inhibitor, BILN 2061.
2. The nitro-Grela catalyst is a stable olefin metathesis initiator active in various ring-closing, cross, and enyne metathesis reactions. Its efficiency has been proven in numerous total syntheses of natural and biologically active compounds, and in material science (see Ref. 1-9)



Tech. Note (1)

RUTHENIUM (Compounds)

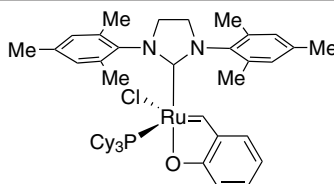
References:

1. *Org. Lett.*, **2008**, 1, 1303
2. *Org. Process Res. Dev.*, **2009**, 13, 250
3. *Org. Lett.*, **2013**, 15, 1016
4. *Chem. Eur. J.*, **2013**, 19, 11847
5. *Org. Lett.*, **2010**, 12, 248
6. *Angew. Chem. Int. Ed.*, **2008**, 47, 6483
7. *Tetrahedron Lett.*, **2006**, 47, 6351
8. *J. Am. Chem. Soc.*, **2004**, 126, 9318
9. *Angew. Chem. Int. Ed.*, **2002**, 41, 4038

44-0753

NEW

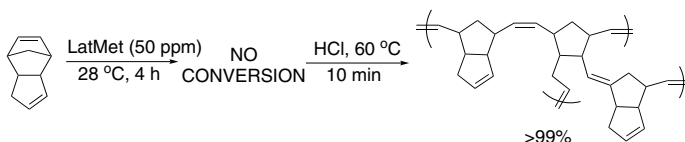
[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)](tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet (1407229-58-6)
 $C_{46}H_{66}ClN_2OPRu$; FW: 829.52; green powdr.
 Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 9,328,132, PCT/EP2013/065839. Apeiron Ruthenium Metathesis Catalyst Kit component.



100mg
500mg

Technical Note:

1. This catalyst is used for olefin metathesis polymerization.



Tech. Note (1)
Ref. (1,2)

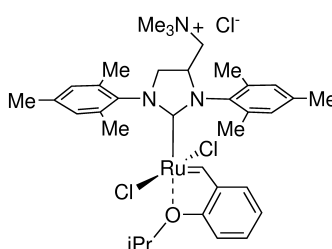
References:

1. *Chem. Eur. J.*, **2014**, 20, 14120
2. *Eur. J. Inorg. Chem.*, **2014**, 1131

44-0765

NEW

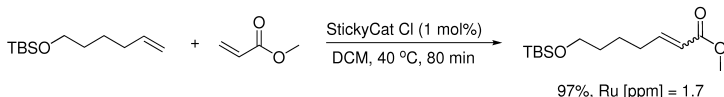
[1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene)dichlororuthenium(II) chloride StickyCat Cl (1452227-72-3)
 $C_{35}H_{48}Cl_2N_3OPRu$; FW: 734.20; green powdr.
 Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 61/603,790, PCT/EP2013/053967. Apeiron Ruthenium Metathesis Catalyst Kit component.



100mg
500mg

Technical Note:

1. This is an easily removable olefin metathesis catalyst. It shows high activity at 40-110 °C. Residual ruthenium metal is usually below 5 ppm.



Tech. Note (1)
Ref. (1)

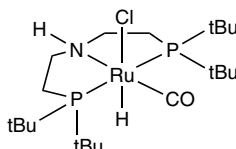
References:

1. *Green Chem.*, **2012**, 14, 3264

44-1035

NEW

Carbonylchlorohydrido[bis(2-di-t-butylphosphinoethyl)amine]ruthenium(II), min. 97% (1421060-10-7)
 $C_{21}H_{46}ClNOP_2Ru$; FW: 527.07; off-white solid
 air sensitive



250mg
1g

RUTHENIUM (Compounds)

44-1043 NEW	Carbonylchlorohydrido[bis(2-di-cyclohexylphosphinoethyl)amine]ruthenium(II), min. 97% (1421060-11-8) $C_{26}H_{54}ClNOP_2Ru$; FW: 631.22; white solid <i>air sensitive</i>		250mg 1g		
44-1032 NEW	Carbonylchlorohydrido[bis(2-di-i-propylphosphinoethyl)amine]ruthenium(II), min. 97% (1311164-69-8) $C_{17}H_{38}ClNOP_2Ru$; FW: 470.96; off-white solid <i>air sensitive</i>		250mg 1g		
44-0760 NEW	Dichloro(1,3-dimesitylimidazolidin-2-ylidene){2-[(ethoxy-2-oxoethylidene)amino]benzylidene} ruthenium(II) HeatMet $C_{32}H_{37}Cl_2N_3O_2Ru$; FW: 667.63; dark purple xtls. (store cold) Note: Sold in collaboration with Apeiron Synthesis, Inc. U.S. Patent 14/443,034; PCT/IN2013/002543.		100mg 500mg		
Technical Note:					
1. HeatMet catalyst is a highly efficient latent catalyst, requiring thermal activation to initiate catalytic activity. Its characteristics are especially suitable to mold polymerization of reactive monomers such as dicyclopentadiene (DCPD). The product is soluble in toluene and dichloromethane.					
		Tech. Note (1) Ref. (1)			
References:					
1. <i>ChemSus Chem.</i> , 2015, 8, 4139.					
44-0428 NEW	Dichloro(mesitylene)ruthenium(II) dimer, 98% (52462-31-4) $C_{18}H_{24}Cl_4Ru_2$; FW: 584.33; red powdr. <i>air sensitive, (store cold)</i>		500mg 2g		
44-0460 NEW	Dihydrotetrakis(triphenylphosphine)ruthenium(II), 95% (19529-00-1) $C_{72}H_{60}P_4Ru$; FW: 1152.23; yellow to green powdr.; m.p. 181-183° <i>air sensitive</i>		250mg 1g		
44-0610 NEW	Hexaammineruthenium(II) chloride, 98% (15305-72-3) $Ru(NH_3)_6Cl_2$; FW: 274.16; pale yellow powdr. <i>air sensitive</i>	250mg 1g 5g			
44-5885 NEW HAZ	Ruthenium(III) chloride hydrate (40-43% Ru) (99.99%+Ru) PURATREM [free of Ru(II) and Ru(IV) by electrochemical analysis] (14898-67-0) $RuCl_3 \cdot xH_2O$; FW: 207.43; black powdr. <i>hygroscopic</i>	1g 5g			

RUTHENIUM (Compounds)

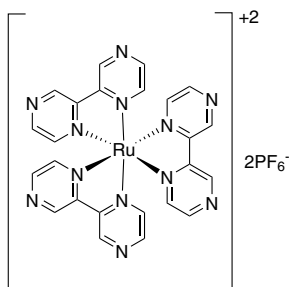
44-7910

NEW

Tris(2,2'-bipyrazine)ruthenium(II) hexafluorophosphate, 95% (80907-56-8)

$C_{24}H_{18}F_{12}N_{12}P_2Ru$; FW: 865.48; red pwdr.
air sensitive

Note: Photocatalyst.

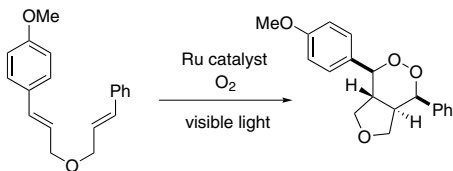


50mg

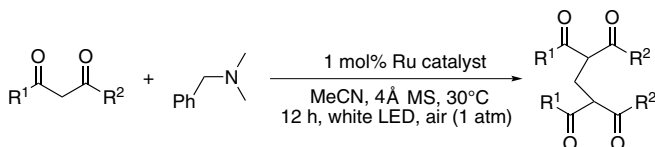
250mg

Technical Notes:

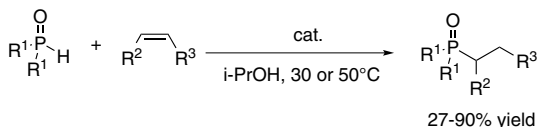
1. Endoperoxide synthesis by photocatalytic aerobic [2+2+2] cycloadditions.
2. Aerobic oxidation of a tertiary aliphatic amine under visible-light photocatalysis. Facile synthesis of methylene-bridged bis-1,3-dicarbonyl compounds.
3. Hydrophosphinylation of unactivated alkenes with secondary phosphine oxides under visible-light photocatalysis.
4. [3+2] Photooxygenation of aryl cyclopropanes via visible light photocatalysis.
5. Photocatalytic synthesis of dihydrobenzofurans by oxidative cycloaddition of phenols.



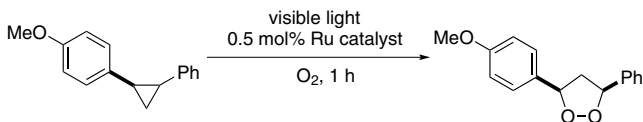
Tech. Note (1)
Ref. (1)



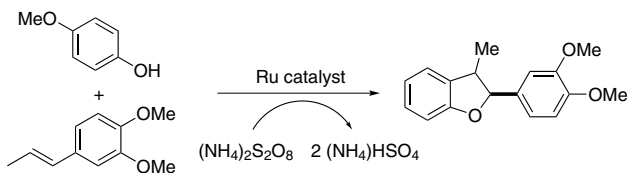
Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)



Tech. Note (5)
Ref. (5)

References:

1. *Org. Lett.*, **2012**, 14, 1640.
2. *Chemistry – An Asian Journal*, **2012**, 7, 2764.

RUTHENIUM (Compounds)

- Green Chemistry, **2013**, 15, 1844.
- Advanced Synthesis & Catalysis, **2014**, 356, 2831.
- J. Am. Chem. Soc., **2015**, 137, 5654.

44-7940

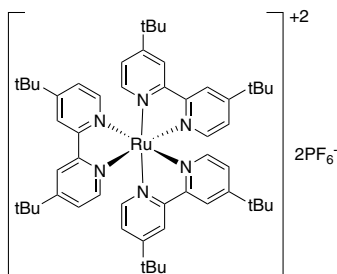
NEW

Tris[4,4'-bis(*t*-butyl)-2,2'-bipyridine]ruthenium(II) hexafluorophosphate, 95% (75777-87-6)

C₅₄H₇₂F₁₂N₆RuP₂; FW: 1196.19;
red powdr.

air sensitive

Note: Photocatalyst.

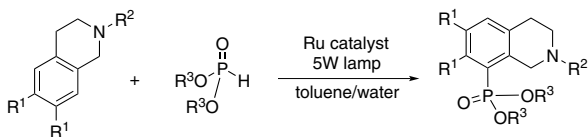


50mg

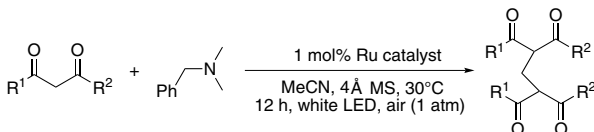
250mg

Technical Notes:

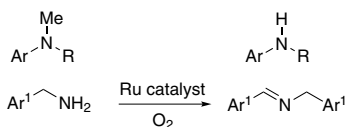
- Photoredox catalysed C-P bond formation reactions – visible light mediated oxidative phosphorylations of amines.
- Aerobic oxidation of a tertiary aliphatic amine under visible-light photocatalysis: facile synthesis of methylene-bridged bis-dicarbonyl compounds.
- Photoredox catalysis as an efficient tool for the aerobic oxidation of amines and alcohols.
- Visible-light induced, direct synthesis of polysubstituted furans from cyclopropyl ketones.



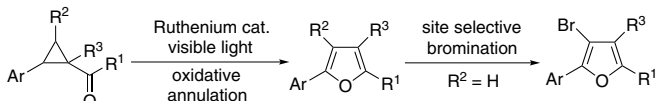
Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)

References:

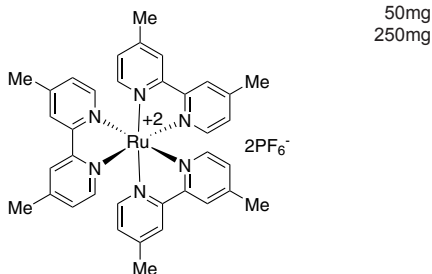
- Chem. Commun., **2011**, 47, 8679.
- Chemistry – An Asian Journal, **2012**, 7, 2764.
- ACS Catalysis, **2012**, 2, 2810.
- J. Org. Chem., **2016**, 81, 7008.

RUTHENIUM (Compounds)

44-7930

NEW

Tris(4,4'-dimethyl-2,2'-bipyridine) ruthenium(II) hexafluorophosphate, 95%, DMBPY (83605-44-1)
 $C_{36}H_{36}F_{12}N_6RuP_2$; FW: 943.71; red powdr.
air sensitive
 Note: Photocatalyst.

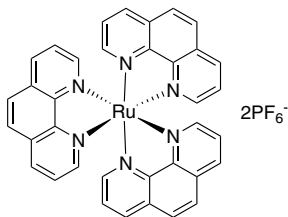


50mg
250mg

44-7955

NEW

Tris(1,10-phenanthroline)ruthenium(II) hexafluorophosphate, 95% (60804-75-3)
 $C_{36}H_{24}F_{12}N_6RuP_2$; FW: 931.62; red powdr.
air sensitive
 Note: Photocatalyst



50mg
250mg

SAMARIUM (Elemental Forms)

62-6235

NEW

HAZ

Samarium powder (99.9% REO) 325 mesh (7440-19-9)
 Sm; FW: 140.4; 325 mesh; m.p. 1072°; b.p. 1778°; d. 7.40
air sensitive, moisture sensitive

5g
25g

SCANDIUM (Compounds)

21-0900

NEW

amp

HAZ

Tris(cyclopentadienyl)scandium, min. 98% (99.9%-Sc) (REO) (1298-54-0)
 $(C_5H_5)_3Sc$; FW: 240.25; beige solid; m.p. 240°; b.p. subl. 200°/0.05mm
air sensitive, moisture sensitive

250mg
1g
5g

SILICON (Compounds)

14-1072

NEW

Bis(t-butylamino)silane, BTBAS (99.999%-Si) PURATREM (186598-40-3)
 $C_8H_{22}N_2Si$; FW: 174.36; colorless liq.; b.p. 167°C; f.p. 30°C; d. 0.816
moisture sensitive

1g
5g
25g

98-8810

NEW

HAZ

Bis(diethylamino)silane, 99% (99.999%-Si) BDEAS PURATREM (27804-64-4)
 $SiH_2[N(CH_2CH_3)_2]_2$; FW: 174.36; colorless liq.
air sensitive, moisture sensitive

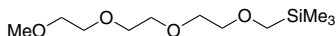
5g
25g

14-1946

NEW

2,2-Dimethyl-4,7,10,13-tetraoxa-2-silatetradecane, 99+% Electrolyte Solvent ANL-1S1M3 (864079-63-0)
 $C_{11}H_{26}O_4Si$; FW: 250.41; colorless liq.
air sensitive, moisture sensitive
 Note: Use for batteries for medical devices expressly excluded. U.S. Patent: 8,076,032

1g
5g



Organosilicon Electrolytes for Lithium Ion Batteries

1. Silicon based electrolytes with polyethylene glycol oligomers improve thermal and electrochemical stability of lithium-ion batteries;
2. Increases battery long-term stability;
3. Are less flammable as conventional organic carbonate-based solvents and maintain the safe operation of batteries
4. Improves conductivity and kinetics of the lithium salts;

Electrochemical and Physical Properties:

1. **Viscosity** 2.0 cP at 25°C; **Conductivity** of 0.8M LiBOB electrolyte: $1.29 \times 10^{-3} \text{ S cm}^{-1}$ at 25°C. **Boiling point**

SILICON (Compounds)

245°C; **Glass transition temperature** -110°C [1, 2].

2. Soluble electrolytic lithium salts: LiBOB, LiPF₆ (03-0325), and LiTFSI

3. ANL-1S1M3 is non-hydrolyzable and less flammable than their alkoxysilane counterparts [2].

4. ANL-1S1M3 electrolyte cell test demonstrated good cycling performance in lithium-ion batteries, with a charge and discharge rate of C/5, cycled between 3.0 and 4.2 V at room temperature with only 9% capacity loss over 200 cycles [2].

References:

1. *Electrochem. Commun.*, **2006**, 8, 429
2. *J. Mater. Chem.*, **2010**, 20, 8224

14-1930

2,2-Dimethyl-3,6,9,12-tetroxa-2-silatrdecane, 99+% Electrolyte

1g

NEW

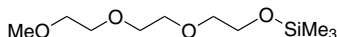
Solvent ANL-1NM3 (864079-62-9)

5g

C₁₀H₂₄O₄Si; FW: 236.38; colorless liq.

Note: Use for batteries for medical devices expressly excluded. U.S.

Patent: 8,076,032



Organosilicon Electrolytes for Lithium Ion Batteries

1. Silicon based electrolytes with polyethylene glycol oligomers improve thermal and electrochemical stability of lithium-ion batteries

2. Increases battery long-term stability.

3. Are less flammable than conventional organic carbonate-based solvents and maintain the safe operation of batteries.

4. Improves conductivity and kinetics of the lithium salts;

Electrochemical and Physical Properties:

1. **Viscosity:** 1.4 cP at 25°C, doped with 0.8M LiBOB electrolyte 1.9 cP at 25°C; **Conductivity:** of 0.8M LiBOB doped electrolyte: 1.18 x 10⁻³S cm⁻¹ at 25°C; **Thermally stable** up to 400°C. **Boiling point** 233-234°C; **Glass transition temperature** -116°C [1, 2].

2. Soluble electrolytic lithium salts: LiBOB, LiPF₆ (03-0325), LiBF₄ (03-0325 Strem product - not battery grade) and LiTFSI

3. ANL-1NM3 electrolytes show excellent charge/discharge cycling behavior in lithium-ion cells. Silane-based electrolytes with certain lithium salts are stable to 4.4 V [1]

4. Compared to other trimethylsilylated polyethyleneoxide oligomers (see also ANL-1NM2; product # 14-1925) with two and three ethylene oxide units, these electrolytic blends are advantageous for the conductivity and kinetics of the lithium salts [2]. In some cases, ANL-1NM3 is more preferable because of the higher boiling point (233-234°C vs 190-191°C of ANL-1NM2) and a lower viscosity.

5. ANL-1NM3 doped with Lithium salts exhibit high ionic conductivity (more than 10⁻³S cm⁻¹) at room temperature. Lithium bis(oxalate)borate (LiBOB) salt blended silicon electrolyte is showing most stable and higher electrochemical performance [3-5]. In addition silylated electrolytes show much better electrochemical stability than carbon and germanium analogues [6].

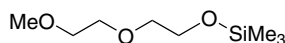
6. Organosilicon electrolyte helps to enhance the transport properties of other electrolytes [7], shows excellent thermal and electrochemical stability [8] and also applicable for Li-air batteries [9]

References:

1. *Electrochem. Commun.*, **2006**, 8, 429
2. *Phys. Chem. C*, **2008**, 112, 2210
3. *J. Power Sources*, **2011**, 196, 2255
4. *J. Power Sources*, **2011**, 196, 8301
5. *J. Phys. Chem. C*, **2011**, 115, 24013
6. *J. Mater. Chem.*, **2008**, 18, 3713
7. *J. Phys. Chem. C*, **2010**, 114, 20569
8. *J. Power Sources*, **2013**, 241, 311
9. *J. Phys. Chem. C*, **2011**, 115, 25535

14-1925

2,2-Dimethyl-3,6,9-trioxa-2-siladecane, 99+% Electrolyte Solvent ANL-1NM2 (62199-57-9)



500mg

NEW

C₈H₂₀O₃Si; FW: 192.33; colorless liq.

2g

air sensitive, moisture sensitive

Note: U.S. Patent: 8,475,688

Organosilicon Electrolytes for Lithium Ion Batteries

1. Silicon based electrolytes with polyethylene glycol oligomers improve thermal and electrochemical stability of lithium-ion batteries

2. Increases battery long-term stability

3. Are less flammable than conventional organic carbonate-based solvents and maintain the safe operation of batteries

SILICON (Compounds)

4. Improves conductivity and kinetics of the lithium salts

Electrochemical and Physical Properties

1. **Viscosity:** 0.9 cP at 25°C; **Conductivity:** $1.2 \times 10^{-3} \text{ S cm}^{-1}$ at 25° (1.0 M LiTFSI); **Boiling point:** 190-191°C;

Glass transition temperature: -129°C [1-3].

2. Soluble electrolyte lithium salt LiTFSI; Less soluble LiBOB.

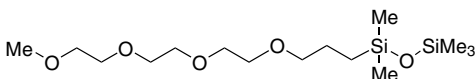
3. Silylated electrolytes show much better electrochemical stability than its carbon and germanium analogues [3].

4. Compares well with other trimethylsilylated polyethyleneoxide oligomers, with longer chain lengths (see also ANL-1NM3; product # 14-1930). Ethylene oxide units in certain electrolytic blends are advantageous improving the conductivity and kinetics of the lithium salts [3-4].

References:

1. *Electrochem. Commun.*, **2006**, 8, 429
2. *J. Phys. Chem. C*, **2008**, 112, 2210
3. *J. Mater. Chem.*, **2008**, 18, 3713
4. *J. Power Sources*, **2014**, 272, 190

14-1955	Hexakis(ethylamino)disilane (99.995%-Si) PURATREM (532980-53-3)	1g
NEW	(C ₂ H ₅ NH) ₆ Si ₂ ; FW: 320.63; colorless liq.; m.p. -7°; b.p. 257°; d. 1.0	5g
HAZ	<i>moisture sensitive</i>	
14-1445	Silicon(IV) bromide, (99.99% Si) PURATREM (7789-66-4)	5g
NEW	SiBr ₄ ; FW: 347.72; colorless liq.; m.p. 5.4°; b.p. 154°; d. 2.772	25g
HAZ	<i>moisture sensitive</i>	
14-7126	Silicon carbide (alpha phase), 0.2-1.2 microns (99%-Si) (409-21-2)	100g
NEW	SiC; FW: 40.10; light-gray powdr.	500g
14-7123	Silicon carbide (>90% beta phase), 0.2-5.0 microns (99+%-Si) (409-21-2)	50g
NEW	SiC; FW: 40.10; light-gray powdr.	250g
14-7120	Silicon carbide (>90% beta phase), 0.1-1.2 microns (99%-Si) (409-21-2)	50g
NEW	SiC; FW: 40.10; gray powdr.	250g
14-7410	Silicon nitride (>90% alpha phase), 0.2-4.0 microns (99%-Si) (12033-89-5)	100g
NEW	Si ₃ N ₄ ; FW: 140.28; gray powdr.	500g
14-7423	Silicon nitride, 0.2-2.5 microns (99.99%-Si) PURATREM (12033-89-5)	50g
NEW	Si ₃ N ₄ ; FW: 140.28; light gray powdr.	250g
14-6990	Tetrakis(ethylmethylamino)silane, 98%, TEMAS (477284-75-6)	1g
NEW	[CH ₃ (CH ₂ CH ₂)N] ₄ Si; FW: 260.57; colorless liq.; b.p. 40°C; d. 0.89	5g
HAZ	<i>moisture sensitive</i>	25g
14-7025	1,1,3,3-Tetramethyldisiloxane, 99+% TMDSO (99.9999%-Si) PURATREM (3277-26-7)	25g
NEW	C ₈ H ₁₈ OSi ₂ ; FW: 134.32; colorless liq.; b.p. 70-71°; f.p. -26°C; d. 0.76	100g
HAZ	<i>moisture sensitive</i>	
14-1943	2,2,4,4-Tetramethyl-3,8,11,14,17-pentaoxa-2,4-disilaooctadecane, 99+% Electrolyte solvent ANL-2SM3 (855996-83-7)	5g
NEW	C ₁₅ H ₃₆ O ₅ Si ₂ ; FW: 352.61; colorless liq. Note: Use for batteries for medical devices expressly excluded. U.S. Patent: 8,076,031 B1; 14/266,052.	25g



Organosilicon Electrolytes for Lithium Ion Batteries

1. Silicon based electrolytes with polyethylene glycol oligomers improve thermal and electrochemical stability of lithium-ion batteries.

2. Increases battery long-term stability.

3. Are less flammable than conventional organic carbonate-based solvents and maintain the safe operation of batteries.

4. Improves conductivity and kinetics of the lithium salts.

Electrochemical and Physical Properties:

SILICON (Compounds)

1. Disiloxane liquid electrolyte ANL-2SM3 exhibits electrochemical stability, high thermal stability, and low viscosity. - **Viscosity** 3.8 cP at 25°C; **The conductivity and viscosity** of ANL-2SM3-based electrolyte are $3.65 \times 10^{-4} \text{ Scm}^{-1}$ and 18 cP at 25°C [1,2] Charged cathode material is more thermally stable in the siloxane-based electrolyte than in the carbonate-based electrolyte [1]. Boiling point 269-271°C; Glass transition temperature -103.0°C
 2. Soluble electrolytic lithium salts: LiBOB, LiPF₆, ANL2SM3, and LiTFSI/ANL-2SM3 is compatible with nanostructured material-based electrodes [3].
 3. Disiloxane/LiBOB or Disiloxane /LiPF₆ electrolytes show conductivities up to $6.2 \times 10^{-4} \text{ Scm}^{-1}$ at room temperature. Disiloxane electrolytes doped with 0.8M LiBOB are stable to 4.7 V. The LiBOB/disiloxane combinations were found to be good electrolytes for lithium-ion cells [4].
- References:

1. *J. Power Sources*, **2006**, 160, 645
2. *J. Power Sources*, **2006**, 160, 1355
3. *Chem. Mater.*, **2007**, 19, 5734
4. *J. Power Sources*, **2010**, 195, 6062

SILVER (Elemental Forms)

47-0645 Silver Nano-Porous Catalyst (promoted with zirconium oxide)
See page 56

SILVER (Compounds)

47-2012 Silver trifluoromethanesulfonate (99.95%-Ag) (Silver triflate)
(2923-28-6)

1g

NEW

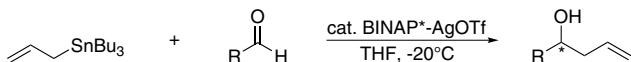
AgSO₃CF₃; FW: 256.94; off-white powdr.
light sensitive, hygroscopic

5g

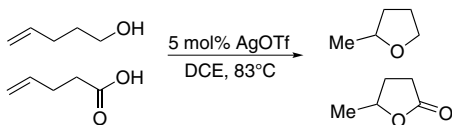
25g

Technical Notes:

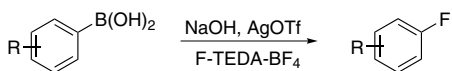
1. Silver precatalyst for the asymmetric allylation of aldehydes
2. Silver catalyst for intramolecular additions of alcohols and carboxylic acids to inert olefins
3. Silver catalyst for the fluorination of boronic acids
4. Silver catalyst for the fluorination of functionalized aryl stannanes
5. Silver catalyst for cyclopropenation of internal alkynes with donor/acceptor substituted diazo compounds
6. Silver catalyst for the reaction of 2-alkynylbenzaldehyde with 2-isocynoacetate
7. Silver catalyst for domino hydroarylation/cycloisomerizations of o-alkynylbenzaldehydes to functionalized isochromenes



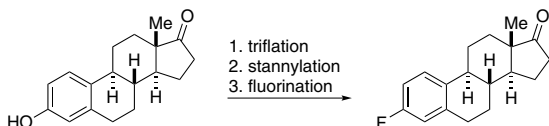
Tech. Note (1)
Ref. (1)



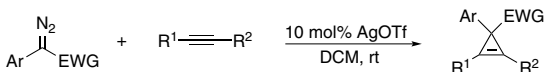
Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)

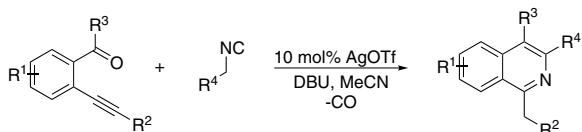


Tech. Note (4)
Ref. (4)

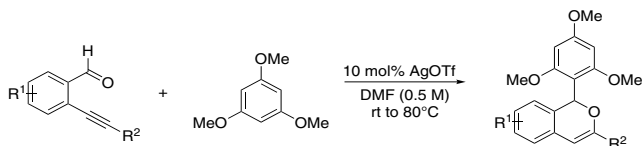


Tech. Note (5)
Ref. (5)

SILVER (Compounds)



Tech. Note (6)
Ref. (6)



Tech. Note (7)
Ref. (7)

References:

1. *J. Am. Chem. Soc.*, **1996**, 118, 4723.
2. *Org. Lett.*, **2005**, 7, 4553.
3. *Org. Lett.*, **2009**, 11, 2860.
4. *J. Am. Chem. Soc.*, **2009**, 131, 1662.
5. *Org. Lett.*, **2011**, 13, 3984.
6. *Org. Lett.*, **2012**, 14, 2655.
7. *Org. Lett.*, **2014**, 16, 4570.

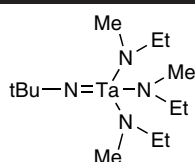
TANTALUM (Compounds)

73-0735

NEW

(*t*-Butylimido)tris(ethylmethylamino)
tantalum(V) (99.99%-Ta) PURATREM
(511292-99-2)

C₁₃H₃₃N₄Ta; FW: 426.38; yellow liq.
air sensitive, moisture sensitive



1g
5g
25g

TIN (Compounds)

50-5022

NEW

HAZ

Tin(IV) chloride, anhydrous (99.99-Sn%) PURATREM (7646-78-8)
SnCl₄; FW: 260.50; colorless liq.; m.p. -33°; b.p. 114.1°C; d. 2.226
air sensitive, moisture sensitive

5g
25g

50-0518

Tin(IV) oxide, nanoparticle (30-60 nm), (99.7%-Sn) (18282-10-5)
See page 56

TITANIUM (Compounds)

22-2240

NEW

HAZ

Tetrakis(dimethylamino)titanium(IV), 99% TDMAT (99.99%-Ti)
PURATREM (3275-24-9)
Ti[N(CH₃)₂]₄; FW: 224.20; yellow to orange liq.; f.p. -22°F
air sensitive, moisture sensitive

1g
5g
25g

22-1060

NEW

amp

HAZ

Tetrakis(ethylmethylamino)titanium, 99% (99.99%-Ti) PURATREM
(308103-54-0)
C₁₂H₃₂N₄Ti; FW: 280.28; yellow to orange liq.
moisture sensitive

2g
10g

22-1175

NEW

Titanium boride, hexagonal crystalline solid, 0.7-10.0 microns, 99%
(12045-63-5)
TiB₂; FW: 69.52; dark-gray solid

50g
250g

22-1190

NEW

Titanium nitride, 1.3-1.9 microns (99+%-Ti) (25583-20-4)
TiN; FW: 61.91; gray powdr.; m.p. 2930°; d. 5.22

100g
500g

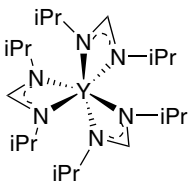
TUNGSTEN (Compounds)

74-1910	Bis(acetonitrile)tetracarbonyltungsten(0) (16800-45-6)	1g
NEW	$C_6H_8N_2O_4W$; FW: 377.98; yellow solid <i>air sensitive</i>	5g
74-3180	Tungsten(VI) oxychloride, 98% (13520-78-0)	1g
NEW	$WOCl_4$; FW: 341.65; orange needles <i>air sensitive, moisture sensitive</i>	5g
		25g

VANADIUM (Compounds)

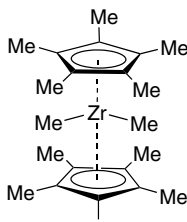
23-0515	Tetrakis(diethylamino)vanadium(IV), min. 95% TDEAV (219852-96-7)	250mg
NEW	$V[N(CH_2CH_3)_2]_4$; FW: 339.46; green liq. <i>air sensitive, moisture sensitive, (store cold)</i>	1g
HAZ		5g

YTTRIUM (Compounds)

39-1550	Tris(N,N'-di-i-propylformamidinato)yttrium(III), 97%	250mg
NEW	$C_{21}H_{45}N_6Y$; FW: 470.53; light beige-yellow solid <i>air sensitive, moisture sensitive</i>	1g
amp	Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard2	5g
		
39-2990	Yttrium(III) oxide, 0.5-2.0 microns (99.95%- Y) (1314-36-9)	50g
NEW	Y_2O_3 ; FW: 225.81; white powdr.; m.p. 2410°; d. 5.01	250g

ZIRCONIUM (Compounds)

40-1054	Bis(pentamethylcyclopentadienyl)dimethylzirconium(IV), 99% (67108-80-9)	250mg
NEW	$[(CH_3)_5C_5H_4]_2Zr(CH_3)_2$; FW: 391.75; white to off-white xtl. <i>air sensitive, moisture sensitive</i>	1g
		5g

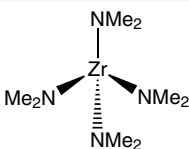


Technical Note:

1. Zirconium complex used as a polymerization catalyst.

References:

1. *J. Am. Chem. Soc.*, **2009**, 131, 16658.
2. *Organometallics*, **2005**, 24, 6013.

40-4115	Tetrakis(dimethylamino)zirconium(IV), 99% (99.99%-Zr) PURATREM TDMZ (19756-04-8)	1g
NEW	$Zr[N(CH_3)_2]_4$; FW: 267.53; light-yellow xtl.; m.p. 57-60°; b.p. 80° (0.1mm) <i>moisture sensitive, (store cold)</i>	5g
amp	Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard1 .	25g
HAZ		
		
98-4042	Tetrakis(dimethylamino)zirconium(IV), 99% (99.99%-Zr) TDMZ, 40-4115, contained in 50ml Swagelok® cylinder (96-1070) for CVD/ALD (19756-04-8)	25g
NEW	$Zr[N(CH_3)_2]_4$; FW: 267.53; light yellow xtl. <i>moisture sensitive, (store cold)</i>	
HAZ	Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard1	

METAL CATALYSTS AND LIGANDS FOR ORGANIC SYNTHESIS

INDEX OF REACTION TYPES

Sorted by Key Element

Amination

46-0935	Methanesulfonato[N-(2-(di-1-adamantylphosphino)phenyl)morpholine](2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [Mor-Dalpos Palladacycle Gen. 3].....	83
27-4011	delta-Tris[(1S,2S)-1,2-diphenyl-1,2-ethanediamine]cobalt(III) chloride tetrakis[3,5-bis(trifluoromethyl)phenyl]borate trihydrate SKJ-3	17
27-4010	lambda-Tris[(1S,2S)-1,2-diphenyl-1,2-ethanediamine]cobalt(III) chloride tetrakis[3,5-bis(trifluoromethyl)phenyl]borate dihydrate SKJ-1	17
28-1090	Chloro(2-methylphenyl)[1,3,5,7-tetramethyl-8-(2-di-o-tolylphosphinophenyl)-2,4,6-trioxa-8-phosphaadamantane]nickel(II), Stradiotto PAd-DalPhos Nickel Catalyst	58
46-0940	Methanesulfonato[N-(2-(di-1-adamantylphosphino)phenyl)morpholine](2'-methylamino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% MorDalpos Palladacycle Gen. 4.....	84
46-0392	Methanesulfonato(1,3,5,7-tetramethyl-8-phenyl-2,4,6-trioxa-8-phosphaadamantane)(2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [MeCgPPh Palladacycle Gen. 3].....	88
46-0348	Methanesulfonato[2-diethylphosphino-2',6'-bis(dimethylamino)-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [EtCPhos Palladacycle Gen. 3].....	87
46-0357	Methanesulfonato(2-di-t-butylphosphino-1,1'-binaphthyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 95% [TrixiePhos Palladacycle Gen. 3]	84
46-2163	Methanesulfonato(2-di-t-butylphosphino-3,4,5,6-tetramethyl-2',4',6'-tri-i-propylbiphenyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 95% [Me4 t-ButylXPhos Palladacycle Gen. 3]	84
46-2158	Methanesulfonato(1,1'-bis(di-t-butylphosphino)ferrocene)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [DTBPF Palladacycle Gen. 3].....	81
46-2153	Methanesulfonato[2,2'-bis(diphenylphosphino)-1,1'-binaphthyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [BINAP Palladacycle Gen. 3].....	81
46-0480	Methanesulfonato[2-(di-1-adamantylphosphino)-3,6-dimethoxy-2',4',6'-tri-i-propyl-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [AdBrettPhos Palladacycle Gen. 3]....	83
46-0333	Methanesulfonato(2-dicyclohexylphosphino-3,6-dimethoxy-2',4',6'-tri-i-propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [BrettPhos Palladacycle Gen. 4]..	86
46-0330	Methanesulfonato(2-di-t-butylphosphino-2',4',6'-tri-i-propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [t-BuXphos Palladacycle Gen. 4].....	85
46-0278	Methanesulfonato(diadamantyl-n-butylphosphino)-2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 95% [cataCXium® A Palladacycle Gen. 3].....	83
46-0959	Methanesulfonato[4,6-bis(diphenylphosphino)phenoxazine](2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [NiXantphos Palladacycle Gen. 3].....	82
46-2128	Methanesulfonato[1,1'-bis(diphenylphosphino)ferrocene]](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [DPPF Palladacycle Gen. 3]	82
46-2135	Methanesulfonato[2-(di-t-butylphosphino)-2'-(N,N-dimethylamino)-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [t-BuDavePhos Palladacycle Gen. 3].....	84
46-0487	Methanesulfonato(2-dicyclohexylphosphino-2',6'-bis(dimethylamino)-1,1'-biphenyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [CPhos Palladacycle Gen. 3]	85
46-0387	Methanesulfonato(tri-t-butylphosphino)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [P(t-Bu) ₃ Palladacycle Gen. 3]	88
46-0388	Methanesulfonato[9,9-dimethyl-4,5-bis(diphenylphosphino)xanthene](2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [Xantphos Palladacycle Gen. 4].....	87
46-0385	Methanesulfonato(tri-t-butylphosphino)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [P(t-Bu) ₃ Palladacycle Gen. 4]	89

46-0379	Methanesulfonato(tricyclohexylphosphino)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [PCy ₃ Palladacycle Gen. 4]	90
46-0395	Methanesulfonato(2-dicyclohexylphosphino-2',6'-di-i-propoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [RuPhos Palladacycle Gen. 4]	86
46-0380	Methanesulfonato(2-dicyclohexylphosphino-2',6'-dimethoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct min. 98% [SPhos Palladacycle Gen. 4]	86
46-0327	Methanesulfonato(2-dicyclohexylphosphino-2',4',6'-tri-i-propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [XPhos Palladacycle Gen. 4]	87

Carbon-carbon bond formation-Cross coupling

15-1967	(S)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 99+% (>99% ee) [(S)-AntPhos]	91
15-1963	(R)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 98+% (>99% ee) [(R)-AntPhos]	91
15-1960	4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 98+% rac-AntPhos	90
29-0225	Copper(I) bromide, dimethyl sulfide complex, 99%	17
46-0348	Methanesulfonato[2-diethylphosphino-2',6'-bis(dimethylamino)-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [ETCPhos Palladacycle Gen. 3]	87
46-0959	Methanesulfonato[4,6-bis(diphenylphosphino)phenoxazine](2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [NiXantphos Palladacycle Gen. 3]	82
46-0487	Methanesulfonato(2-dicyclohexylphosphino-2',6'-bis(dimethylamino)-1,1'-biphenyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [CPhos Palladacycle Gen. 3]	85
46-0440	Chloro(1-t-butylindenyl)[2-(dicyclohexylphosphino)-2',6'-di-i-propoxy-1,1'-biphenyl]palladium(II)	75
46-0437	Chloro(1-t-butylindenyl)[2-(dicyclohexylphosphino)-2',4',6'-tri-i-propyl-1,1'-biphenyl]palladium(II)	75
46-0435	Chloro(1-t-butylindenyl)[2-(dicyclohexylphosphino)-2',6'-dimethoxy-1,1'-biphenyl]palladium(II)	74
28-0165	Chloro(2-methylphenyl)(N,N,N',N'-tetramethyl-1,2-ethylenediamine)nickel(II), 99% (contains about 5% o-chlorotoluene) NiCl(o-tolyl)(TMEDA)	58
46-0815	Chloro(1-t-butylindenyl)[1,3-bis(2,6-di-i-propylphenyl)imidazol-2-yl]palladium(II), 98%	76
46-0379	Methanesulfonato(tricyclohexylphosphino)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [PCy ₃ Palladacycle Gen. 4]	90
46-0333	Methanesulfonato(2-dicyclohexylphosphino-3,6-dimethoxy-2',4',6'-tri-i-propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [BrettPhos Palladacycle Gen. 4] ..	86
46-0395	Methanesulfonato(2-dicyclohexylphosphino-2',6'-di-i-propoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [RuPhos Palladacycle Gen. 4]	86
46-0380	Methanesulfonato(2-dicyclohexylphosphino-2',6'-dimethoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct min. 98% [SPhos Palladacycle Gen. 4]	86
46-1553	(2'-Methylamino-1,1'-biphenyl-2-yl)methanesulfonatopalladium(II) dimer, min. 98%	90
46-0327	Methanesulfonato(2-dicyclohexylphosphino-2',4',6'-tri-i-propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [XPhos Palladacycle Gen. 4]	87

Carbon-carbon bond formation-General

46-0935	Methanesulfonato[N-[2-(di-1-adamantylphosphino)phenyl]morpholine](2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [Mor-Dalpos Palladacycle Gen. 3]	83
46-0940	Methanesulfonato[N-[2-(di-1-adamantylphosphino)phenyl]morpholine](2'-methylamino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% MorDalpos Palladacycle Gen. 4	84

46-0392	Methanesulfonato(1,3,5,7-tetramethyl-8-phenyl-2,4,6-trioxa-8-phosphaadamantane) (2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [MeCgPPh Palladacycle Gen. 3].....	88
15-0543	(11aS)-3,7-Bis(3,5-dimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	95
15-0542	(11aR)-3,7-Bis(3,5-dimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	95
15-0528	(11aS)-3,7-Bis[3,5-bis(trifluoromethyl)phenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	92
15-0527	(11aR)-3,7-Bis[3,5-bis(trifluoromethyl)phenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	92
15-1364	(11aS)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-9-phenanthrenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	110
15-1363	(11aR)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-9-phenanthrenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	109
15-0341	(S)-(+)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, min. 98% [(S)-TiPSY]	99
15-0340	(R)-(-)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, min. 98% [(R)-TiPSY]	97
77-0468	Di-μ-chlorotetrakis[3,5-difluoro-2-[5-trifluoromethyl-2-pyridinyl-kN)phenyl-kC]diiridium(III), 99% ..	28
79-0245	[1,3-Bis(2,6-di-i-propylphenyl)imidazol-2-ylidene][bis(trifluoromethanesulfonyl)imide]gold(I), min. 95%.....	19
28-0110	Chlorobis(triphenylphosphino)phenylnickel(II), 98%	57
77-0465	(2,2'-Bipyridine)bis[2-pyridinyl-kN)phenyl-kC]iridium(III) hexafluorophosphate, 99%.....	25
46-0357	Methanesulfonato(2-di-t-butylphosphino-1,1'-binaphthyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 95% [TrixiePhos Palladacycle Gen. 3]	84
46-2163	Methanesulfonato(2-di-t-butylphosphino-3,4,5,6-tetramethyl-2',4',6'-tri-i-propylbiphenyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 95% [Me4 t-ButylXPhos Palladacycle Gen. 3]	84
46-2158	Methanesulfonato(1,1'-bis(di-t-butylphosphino)ferrocene)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [DTBPF Palladacycle Gen. 3].....	81
46-1058	Chloro[2-{(1-(N-phenyl)iminoethyl)phenyl}][1,3-bis(2,6-di-i-propylphenyl)imidazole-2-ylidene]palladium(II).....	77
46-1050	Chloro[2-{1-(N-methoxy)iminoethyl}phenyl][1,3-bis(2,6-di-i-propylphenyl)imidazole-2-ylidene]palladium(II).....	76
26-0923	Dichloro[1,2-bis(diphenylphosphino)ethane]iron(II), 98%.....	32
45-2105	Tetrakis[5-t-butyl-phthaloyl-N-(S)-tert-leucinato]dirhodium bis(ethyl acetate) adduct Rh2(S-tertPTTL)4	117
46-2153	Methanesulfonato[2,2'-bis(diphenylphosphino)-1,1'-binaphthyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [BINAP Palladacycle Gen. 3]	81
40-1054	Bis(pentamethylcyclopentadienyl)dimethylzirconium(IV), 99%	131
46-2135	Methanesulfonato[2-(di-t-butylphosphino)-2'-(N,N-dimethylamino)-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [t-BuDavePhos Palladacycle Gen. 3].....	84
46-2128	Methanesulfonato[1,1'-bis(diphenylphosphino)ferrocene](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [DPPF Palladacycle Gen. 3]	82
46-0487	Methanesulfonato(2-dicyclohexylphosphino-2',6'-bis(dimethylamino)-1,1'-biphenyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [CPhos Palladacycle Gen. 3].....	85
46-0387	Methanesulfonato(tri-t-butylphosphino)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [P(t-Bu)3 Palladacycle Gen. 3]	88
75-2365	Chlorotricarbonyl(4,4'-di-t-butyl-2,2'-bipyridine)rhenium(I), 99%.....	116
45-0655	Bromotris(triphenylphosphine)rhodium(I), 99% (99.9%-Rh).....	116

77-0425	(4,4'-Di-t-butyl-2,2'-bipyridine)bis[3,5-difluoro-2-[5-trifluoromethyl-2-pyridinyl-kN)phenyl-kC] iridium(III) hexafluorophosphate, 99%.....	27
15-1729	Di-t-butyl(3-methyl-2-butenyl)phosphine (40% in xylene), 98% Crophos®.....	101
15-1725	Di-t-butyl(2-butenyl)phosphine (40% in xylene), 98% m-Crophos®.....	101
46-0028	Chloro(tri-t-butylphosphine)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98%	78
46-0388	Methanesulfonato[9,9-dimethyl-4,5-bis(diphenylphosphino)xanthene](2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [Xantphos Palladacycle Gen. 4].....	87
46-0188	Dichloro[(R)-(+)-2,2'-bis(di-2-furanylphosphino)-6,6'-dimethoxy-1,1'-biphenyl]palladium(II)	79
07-0496	(2R,3S)-(-)-3,4-Dihydro-3-(i-propyl)-2-phenyl-2H-pyrimido[2,1-b]benzothiazole, min. 98% HyperBTM	66
46-0257	Diacetato[1,3-bis(diphenylphosphino)propane]palladium(II), 99%.....	78
07-0484	1,3-Bis(2,6-di-i-propylphenyl)imidazolium bicarbonate, min. 97% IPRH.HCO ₃	64
07-4033	1,3-Bis(2,4,6-trimethylphenyl)imidazolium bicarbonate, min. 97% IMES.H.HCO ₃	65
77-0410	(4,4'-Di-t-butyl-2,2'-bipyridine)bis[2-(2-pyridinyl-kN)phenyl-kC]iridium(III) hexafluorophosphate, 99%	28
46-0385	Methanesulfonato(tri-t-butylphosphino)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [P(t-Bu) ₃ Palladacycle Gen. 4]	89
15-6528	[2-Dicyclohexylphosphino-3-methoxy-N-methyl-N-phenylbenzenamine, 98% Zheda-Phos	104
15-6525	[2,6-Di-i-propoxyphenyl]dicyclohexylphosphonium tetrafluoroborate, 98% GorlosPhosHBF ₄ ..	107
15-6520	[2,4,6-Trimethoxyphenyl]dicyclohexylphosphonium tetrafluoroborate, 98% LB-PhosHBF ₄	111
15-0185	(R)-(+)-2,2'-Bis[di(3,5-dimethoxyphenyl)phosphino]-6,6'-dimethoxy-1,1'-biphenyl, 98% (R)-ECNU-Phos	95
15-1227	(S)-(+)-(3,5-Dioxa-4-phosphacyclohepta[2,1-a;3,4-a']dinaphthalen-4-yl)-5H-dibenz[b,f]azepine, min. 97%	106
44-0750	[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene][2-[[1-(methoxy(methyl)amino)-1-oxopropan-2-yl]oxy]benzylidene]ruthenium(II) dichloride GreenCat.....	120
44-0753	[1,3-Bis(2,4,6-trimethylphenyl)imidazolidin-2-ylidene](tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet	122
44-0765	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene)dichlororuthenium(II) chloride StickyCat Cl	122
44-0768	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(4-ethyl-4-methylpiperazin-1-ium-1-yl)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene)dichlororuthenium(II) chloride AquaMet	121
44-0758	[1,3-Bis(2,4,6-trimethylphenyl)imidazolidin-2-ylidene]-(2-i-propoxy-5-nitrobenzylidene)ruthenium(II) dichloride nitro-Grela.....	121
46-0463	Dichloro[bis(2-(diphenylphosphino)phenyl)ether]palladium(II), 98%	80
46-0298	Chloro[(1,2,3-η)-1-phenyl-2-propen-1-yl]-[[1,3-bis[2,6-bis(diphenylmethyl)-4-methylphenyl]-2H-imidazol-2-ylidene]palladium(II), min. 97%	77

Carbon-carbon bond formation-Heck Reaction

15-1729	Di-t-butyl(3-methyl-2-butenyl)phosphine (40% in xylene), 98% Crophos®.....	101
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Carbon-heteroatom bond formation

46-0935	Methanesulfonato[N-[2-(di-1-adamantylphosphino)phenyl]morpholine](2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [Mor-Dalphos Palladacycle Gen. 3].....	83
28-0518	Chloro(2-methylphenyl)[1,1'-bis(diphenylphosphino)ferrocene]nickel (II), 98%	58
46-0940	Methanesulfonato[N-[2-(di-1-adamantylphosphino)phenyl]morpholine](2'-methylamino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% MorDalphos Palladacycle Gen. 4.....	84
46-0308	Bis[(trimethylsilyl)methyl](1,5-cyclooctadiene)palladium(II), 98%.....	74

46-0241	Bis[[2-(Diadamantylphosphino)-3-methoxy-2',4',6'-tri-i-propyl-3'-(2,3,5,6-tetrafluoro-4-butylphenyl)-1,1'-biphenyl]palladium(0)]1,5-cyclooctadiene, [AlPhos Palladium complex].....	74
46-0392	Methanesulfonato(1,3,5,7-tetramethyl-8-phenyl-2,4,6-trioxa-8-phosphaadamantane)(2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [MeCgPPh Palladacycle Gen. 3].....	88
15-0543	(11aS)-3,7-Bis(3,5-dimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	95
15-0542	(11aR)-3,7-Bis(3,5-dimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	95
15-0528	(11aS)-3,7-Bis(3,5-bis(trifluoromethyl)phenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	92
15-0527	(11aR)-3,7-Bis(3,5-bis(trifluoromethyl)phenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	92
15-1364	(11aS)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-9-phenanthrenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	110
15-1363	(11aR)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-9-phenanthrenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98%.....	109
15-0341	(S)-(+)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, min. 98% [(S)-TIPSY].....	99
15-0340	(R)-(-)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, min. 98% [(R)-TIPSY].....	97
46-0348	Methanesulfonato[2-diethylphosphino-2',6'-bis(dimethylamino)-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [EtCPhos Palladacycle Gen. 3].....	87
46-0310	Di-μ-iodobis(tri-t-butylphosphino)dipalladium(I), 98%	81
79-0245	[1,3-Bis(2,6-di-i-propylphenyl)imidazol-2-ylidene][bis(trifluoromethanesulfonyl)imide]gold(II), min. 95%.....	19
77-0258	Chloro(1,5-cyclooctadiene)(1,10-phenanthroline)iridium(I) THF adduct, min. 98%	26
77-0465	(2,2'-Bipyridine)bis(2-pyridinyl-kN)phenyl-kC]iridium(III) hexafluorophosphate, 99%.....	25
46-0357	Methanesulfonato(2-di-t-butylphosphino-1,1'-binaphthyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 95% [TrixiePhos Palladacycle Gen. 3].....	84
46-2163	Methanesulfonato(2-di-t-butylphosphino-3,4,5,6-tetramethyl-2',4',6'-tri-i-propylbiphenyl)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 95% [Me4 t-ButylXPhos Palladacycle Gen. 3].....	84
46-2158	Methanesulfonato(1,1'-bis(di-t-butylphosphino)ferrocene)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [DTBPF Palladacycle Gen. 3].....	81
27-0575	Dichlorobis(triphenylphosphine)cobalt(II), 98%	16
46-2153	Methanesulfonato[2,2'-bis(diphenylphosphino)-1,1'-binaphthyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [BINAP Palladacycle Gen. 3].....	81
46-2135	Methanesulfonato[2-(di-t-butylphosphino)-2'-(N,N-dimethylamino)-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct, min. 98% [t-BuDavePhos Palladacycle Gen. 3].....	84
46-0959	Methanesulfonato[4,6-bis(diphenylphosphino)phenoxazine](2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [NiXantphos Palladacycle Gen. 3].....	82
46-2128	Methanesulfonato[1,1'-bis(diphenylphosphino)ferrocene](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [DPPF Palladacycle Gen. 3].....	82
46-0387	Methanesulfonato(tri-t-butylphosphino)(2'-amino-1,1'-biphenyl-2-yl)palladium(II), 98% [P(t-Bu)3 Palladacycle Gen. 3].....	88
46-0440	Chloro(1-t-butylindenyl)(2-(dicyclohexylphosphino)-2',6'-di-i-propoxy-1,1'-biphenyl)palladium(II)	75
45-0655	Bromotris(triphenylphosphine)rhodium(I), 99% (99.9%-Rh).....	116
77-0425	(4,4'-Di-t-butyl-2,2'-bipyridine)bis[3,5-difluoro-2-[5-trifluoromethyl-2-pyridinyl-kN)phenyl-kC]iridium(III) hexafluorophosphate, 99%.....	27

15-1725	Di- <i>t</i> -butyl(2-butenyl)phosphine (40% in xylene), 98% m-Crophos®.....	101
28-0096	Bis(triphenylphosphino)(2-methylphenyl)chloronickel(II), 99%.....	57
46-0480	Methanesulfonato[2-(di-1-adamantylphosphino)-3,6-dimethoxy-2',4',6'-tri- <i>i</i> -propyl-1,1'-biphenyl](2'-amino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [AdBrettPhos Palladacycle Gen. 3]....	83
07-4055	1,3-Bis(2,6-di- <i>i</i> -propylphenyl)-2-chloroimidazolium chloride/cesium fluoride admixture (1.0/6.7 molar ratio or 1/2.2 weight ratio) PhenoFluor®Mix	63
46-0388	Methanesulfonato[9,9-dimethyl-4,5-bis(diphenylphosphino)xanthene](2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [Xantphos Palladacycle Gen. 4].....	87
07-0496	(2 <i>R</i> ,3 <i>S</i>)-(-)-3,4-Dihydro-3-(<i>i</i> -propyl)-2-phenyl-2 <i>H</i> -pyrimido[2,1- <i>b</i>]benzothiazole, min. 98% HyperBTM	66
46-0257	Diacetato[1,3-bis(diphenylphosphino)propane]palladium(II), 99%.....	78
07-0484	1,3-Bis(2,6-di- <i>i</i> -propylphenyl)imidazolium bicarbonate, min. 97% IPrH.HCO ₃	64
07-4033	1,3-Bis(2,4,6-trimethylphenyl)imidazolium bicarbonate, min. 97% IMesH.HCO ₃	65
77-0440	Bis(pyridine)(1,5-cyclooctadiene)iridium(I) hexafluorophosphate, 99%	25
77-0410	(4,4'-Di- <i>t</i> -butyl-2,2'-bipyridine)bis[2-(2-pyridinyl- <i>k</i> <i>N</i>)phenyl- <i>k</i> <i>C</i>]iridium(III) hexafluorophosphate, 99%	28
46-0385	Methanesulfonato(tri- <i>t</i> -butylphosphino)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [P(<i>t</i> -Bu) ₃ Palladacycle Gen. 4].....	89
46-0379	Methanesulfonato(tricyclohexylphosphino)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), 98% [PCy ₃ Palladacycle Gen. 4]	90
46-0333	Methanesulfonato(2-dicyclohexylphosphino-3,6-dimethoxy-2',4',6'-tri- <i>i</i> -propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [BrettPhos Palladacycle Gen. 4]..	86
15-6520	[2,4,6-Trimethoxyphenyl]dicyclohexylphosphonium tetrafluoroborate, 98% LB-PhosHBF ₄	111
46-0395	Methanesulfonato(2-dicyclohexylphosphino-2',6'-di- <i>i</i> -propoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [RuPhos Palladacycle Gen. 4]	86
46-0380	Methanesulfonato(2-dicyclohexylphosphino-2',6'-dimethoxy-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II) dichloromethane adduct min. 98% [SPhos Palladacycle Gen. 4].....	86
15-1154	2-Dicyclohexylphosphino-4'-(<i>N,N</i> -dimethylamino)-1,1'-biphenyl, 98%.....	103
46-1553	(2'-Methylamino-1,1'-biphenyl-2-yl)methanesulfonatopalladium(II) dimer, min. 98%.....	90
15-1227	(<i>S</i>)-(+)-(3,5-Dioxo-4-phosphacyclohepta[2,1- <i>a</i> ;3,4- <i>a'</i>]dinaphthalen-4-yl)-5 <i>H</i> -dibenz[<i>b,f</i>]azepine, min. 97%	106
46-0327	Methanesulfonato(2-dicyclohexylphosphino-2',4',6'-tri- <i>i</i> -propyl-1,1'-biphenyl)(2'-methylamino-1,1'-biphenyl-2-yl)palladium(II), min. 98% [XPhos Palladacycle Gen. 4]	87

Cyclization

45-2105	Tetrakis[5- <i>t</i> -butyl-phthaloyl- <i>N</i> -(<i>S</i>)-tert-leucinato]dirhodium bis(ethyl acetate) adduct Rh ₂ (<i>S</i> -tertPTTL) ₄	117
15-6520	[2,4,6-Trimethoxyphenyl]dicyclohexylphosphonium tetrafluoroborate, 98% LB-PhosHBF ₄	111
15-1227	(<i>S</i>)-(+)-(3,5-Dioxo-4-phosphacyclohepta[2,1- <i>a</i> ;3,4- <i>a'</i>]dinaphthalen-4-yl)-5 <i>H</i> -dibenz[<i>b,f</i>]azepine, min. 97%	106

Dehydrogenation

44-1043	Carbonylchlorohydrido[bis(2-di-cyclohexylphosphinoethyl)amine]ruthenium(II), min. 97%	123
44-1032	Carbonylchlorohydrido[bis(2-di- <i>i</i> -propylphosphinoethyl)amine]ruthenium(II), min. 97%	123
44-1035	Carbonylchlorohydrido[bis(2-di- <i>t</i> -butylphosphinoethyl)amine]ruthenium(II), min. 97%	122

Hydroboration

15-1967	(<i>S</i>)-4-(Anthracen-9-yl)-3-(<i>t</i> -butyl-2,3-dihydrobenzo[<i>d</i>][1,3]oxaphosphole,99+% (>99% ee) [(<i>S</i>)-AntPhos].....	91
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15-1963	(R)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole,98+% (>99% ee) [(R)-AntPhos].....	91
15-1960	4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 98+% rac-AntPhos.....	90

Hydrogenation

15-1975	(2S,2'S,3S,3'S)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98%, (>99% ee), [(2S,2'S,3S,3'S)-WingPhos]	101
15-1970	(2R,2'R,3R,3'R)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98% (>90% ee), [(2R,2'R,3R,3'R)-WingPhos]	100
78-3035	Platinum nanoparticles, 30% on carbon black (surfactant and reactant-free).....	114
78-3032	Platinum nanoparticles, 20% on carbon black (surfactant and reactant-free).....	114
78-3030	Platinum nanoparticles, 10% on carbon black (surfactant and reactant-free).....	114
78-3026	Platinum nanoparticles, 10% on Titania (anatase) (surfactant and reactant-free).....	114
78-3023	Platinum nanoparticles, 10% on Titania (rutile) (surfactant and reactant-free).....	114
78-3020	Platinum nanoparticles, 5% on carbon black (surfactant and reactant-free).....	114
78-3015	Platinum nanoparticles, 1% on carbon black (surfactant and reactant-free).....	114
78-3012	Platinum nanoparticles, 1% on Titania (anatase) (surfactant and reactant-free).....	114
78-3005	Platinum nanoparticles, 1% on Titania (rutile) (surfactant and reactant-free).....	114
44-0355	[Bis(pyrazol-1-yl)(acetimino)hydridoborato](p-cymene)ruthenium(II) trifluoromethanesulfonate ..	120
44-6085	Allylbis(2-aminoethyldiphenylphosphino)ruthenium(II) tetrafluoroborate, 98%	118
26-0873	Bromocarbonyl[(1S,2S)-2,3-diphenylethylenediamine-N,N'-bis(2-diphenylphosphinoethyl-lidene)]iron(II) tetraphenylborate, FeATHer-II Catalyst.....	32
77-4036	Chlorodihydrido{(S)-(-)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(3-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane}iridium(III), >97% (>99% ee) Ir-(S)-DTB-SpiroPAP-3-Me.....	27
77-4035	Chlorodihydrido{(R)-(+)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(3-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane}iridium(III), >97% (>99% ee) Ir-(R)-DTB-SpiroPAP-3-Me.....	26
15-5167	(S)-(-)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(pyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (S)-DTB-SpiroPAP	94
15-5166	(R)-(+)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(pyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP	94
15-5159	(S)-(-)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(3-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (S)-DTB-SpiroPAP-3-Me.....	94
15-5158	(R)-(+)-7-Bis(3,5-di-t-butylphenyl)phosphino-7'-[(3-methylpyridine-2-ylmethyl)amino]-2,2',3,3'-tetrahydro-1,1'-spirobiindane, min. 98% (>99% ee) (R)-DTB-SpiroPAP-3-Me.....	93
77-2511	{(S)-(-)-7-[N-(1,3-Dithian-2-yl)methylamino]-7'-[bis(3,5-di-t-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane}chlorodihydroiridium(III), 97+% [Ir-(S)-DTB-SpiroSAP]	29
77-2510	{(R)-(+)-7-[N-(1,3-Dithian-2-yl)methylamino]-7'-[bis(3,5-di-t-butylphenyl)phosphino]-2,2',3,3'-tetrahydro-1,1'-spirobindane}chlorodihydroiridium(III), 97+% [Ir-(R)-DTB-SpiroSAP]	29
75-2360	Chlorotricarbonyl(2,2'-bipyridine)rhenium(I), 99%	116
15-1053	(3S,3'S,4S,4'S,11bS,11'bS)-(+)-4,4'-Di-t-butyl-4,4',5,5'-tetrahydro-3,3'-bi-3H-dinaphtho[2,1-c:1',2'-e]phosphepin, 97% (S)-BINAPINE	102
77-0440	Bis(pyridine)(1,5-cyclooctadiene)iridium(I) hexafluorophosphate, 99%	25

Hydrolysis

96-0224	Novozymes Endoprotease Screening Kit (contains 6 endoprotease enzymes).....	44
06-3160	Neutrase® 0.8 L	9

06-3155	Lipozyme® TL IM	9
06-3135	Novozym® 51032	10
06-3150	Savinase® 16 L	11
06-3140	Lipozyme® TL 100 L	9
06-3137	Savinase® 12 T	11
06-3125	Resinase® HT	11
06-3123	Novozym® 435	10
06-3120	Novozym® 40086	10
06-3118	Palatase® 20000 L	10
06-3115	Esperase® 8.0 L	9
06-3112	Alcalase® 2.5 L	2
06-3100	NovoCor® AD L	10
06-3110	Alcalase® 2.4 L FG	1
06-3105	Lipozyme® CALB L	9

Isomerization

44-0460	Dihydrotetrakis(triphenylphosphine)ruthenium(II), 95%	123
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Metathesis

44-0760	Dichloro(1,3-dimesitylimidazolidin-2-ylidene){2-[(ethoxy-2-oxoethylidene)amino]benzylidene} ruthenium(II) HeatMet	123
44-0759	(1,3-Bis(2,6-diisopropylphenyl)-4-[(4-ethyl-4-methylpiperazin-1-ium-1-yl)methyl]imidazolidin-2-ylidene)(2-isopropoxybenzylidene)ruthenium(II) chloride dihydrate FixCat	119
44-0750	[1,3-Bis(2,6-di-i-propylphenyl)imidazolidin-2-ylidene]{2-[[1-(methoxy(methyl)amino)-1-oxopropan-2-yl]oxy]benzylidene}ruthenium(II) dichloride GreenCat	120
44-0753	[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)](tricyclohexylphosphine)-(2-oxobenzylidene)ruthenium(II) chloride LatMet	122
44-0765	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(trimethylammonio)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene)dichlororuthenium(II) chloride StickyCat Cl	122
44-0768	[1,3-Bis(2,4,6-trimethylphenyl)-4-[(4-ethyl-4-methylpiperazin-1-ium-1-yl)methyl]imidazolidin-2-ylidene]-(2-i-propoxybenzylidene)dichlororuthenium(II) chloride AquaMet	121
44-0758	[1,3-Bis(2,4,6-trimethylphenylimidazolidin-2-ylidene)]-(2-i-propoxy-5-nitrobenzylidene)ruthenium(II) dichloride nitro-Grela	121

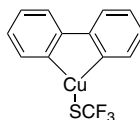
Oxidation

46-0970	Acetato(2,9-dimethyl-1,10-phenanthroline)palladium(II) dimer bis(trifluoromethanesulfonate), 99%	73
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NEW PRODUCTS COMING SOON!

COPPER (Compounds)

29-5515 Trifluoromethylthiolato(2,2-bipyridine)copper(I), 97% (1413732-47-4)
 $C_{11}H_8CuF_3N_2S$; FW: 320.80; red xtl.
air sensitive, moisture sensitive



250mg
1g

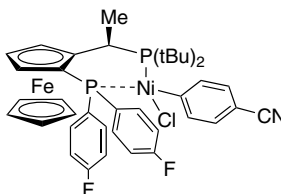
GERMANIUM (Compounds)

32-3215 Germanium(II) chloride dioxane adduct (28595-67-7)
 $C_4H_8Cl_2GeO_2$; FW: 231.65
moisture sensitive

2g
10g

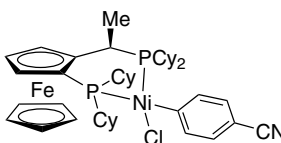
NICKEL (Compounds)

28-0178 Chloro(4-cyanophenyl){(R)-1-[(S)-2-(bis(4-fluorophenyl)phosphino)ferrocenyl]ethyl(di-t-butylphosphine)}nickel(II)
 $C_{39}H_{42}ClF_4FeNiP_2$; FW: 774.69
 Note: Sold in collaboration with Solvias for research purposes only.



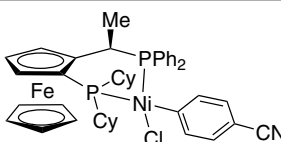
100mg
500mg

28-0172 Chloro(4-cyanophenyl){(R)-1-[(S)-2-(dicyclohexylphosphino)ferrocenyl]ethyl(dicyclohexylphosphine)}nickel(II)
 $C_{43}H_{60}ClFeNiP_2$; FW: 802.88
 Note: Sold in collaboration with Solvias for research purposes only.



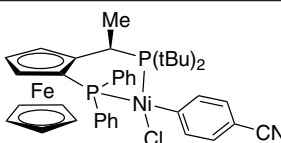
100mg
500mg

28-0175 Chloro(4-cyanophenyl){(R)-1-[(S)-2-(dicyclohexylphosphino)ferrocenyl]ethyl(diphenylphosphine)}nickel(II)
 $C_{43}H_{48}ClFeNiP_2$; FW: 790.79
 Note: Sold in collaboration with Solvias for research purposes only.



100mg
500mg

28-0170 Chloro(4-cyanophenyl){(R)-1-[(S)-2-(diphenylphosphino)ferrocenyl]ethyl(di-t-butylphosphine)}nickel(II) (1807948-77-1)
 $C_{39}H_{44}ClFeNiP_2$; FW: 738.71
 Note: Sold in collaboration with Solvias for research purposes only.



100mg
500mg

NITROGEN (Compounds)

07-1813 2,6-Dichloro-1-fluoropyridinium triflate, 95% (130433-68-0)
 $C_5H_3Cl_2F_3NO_3S$; FW: 316.06; white to light-yellow powd.
moisture sensitive, (store cold)

500mg
2g

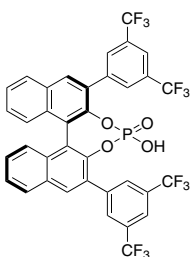
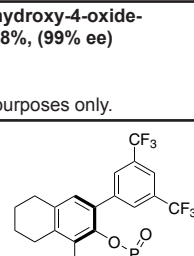
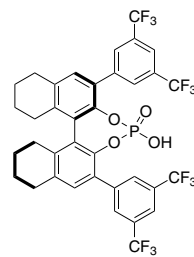
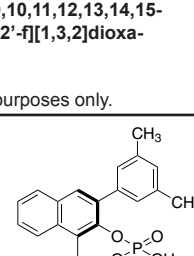
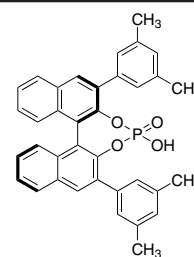
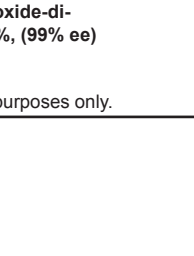
07-1828 1-Fluoropyridinium triflate, 95% (107263-95-6)
 $C_5H_5F_4NO_3S$; FW: 247.17; white to pale-yellow powd.
moisture sensitive, (store cold)

500mg
2g

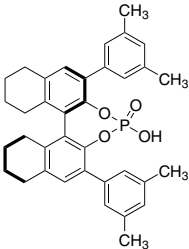
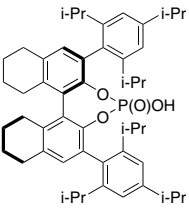
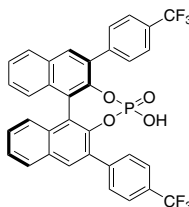
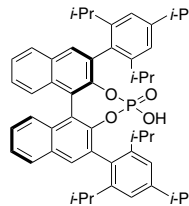
07-1835 1-Fluoro-2,4,6-trimethylpyridinium triflate (107264-00-6)
 $C_9H_{11}F_4NO_3S$; FW: 289.25; white to pale-yellow powd.
moisture sensitive, (store cold)

500mg
2g

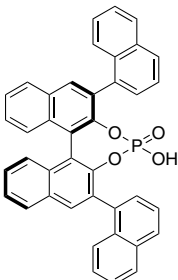
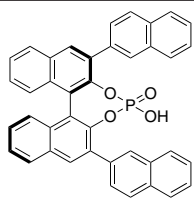
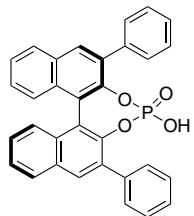
PHOSPHORUS (Compounds)

15-1366	(11bR)-2,6-Bis[3,5-bis(trifluoromethyl)phenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (791616-62-1) C₃₆H₁₇F₁₂O₄P; FW: 772.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1367	(11bS)-2,6-Bis[3,5-bis(trifluoromethyl)phenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (878111-17-2) C₃₆H₁₇F₁₂O₄P; FW: 772.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1376	(11bR)-2,6-Bis[3,5-bis(trifluoromethyl)phenyl]-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1011465-24-9) C₃₆H₂₅F₁₂O₄P; FW: 780.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1377	(11bS)-2,6-Bis[3,5-bis(trifluoromethyl)phenyl]-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) C₃₆H₂₅F₁₂O₄P; FW: 780.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1368	(11bR)-2,6-Bis(3,5-dimethylphenyl)-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (861909-53-7) C₃₆H₂₉O₄P; FW: 556.6; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1369	(11bS)-2,6-Bis(3,5-dimethylphenyl)-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1170736-59-0) C₃₆H₂₉O₄P; FW: 556.6; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg

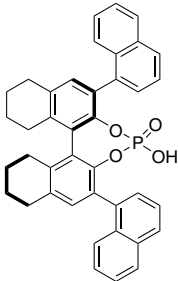
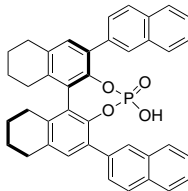
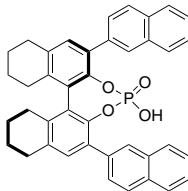
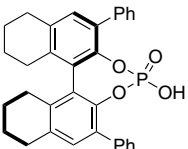
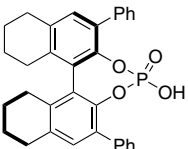
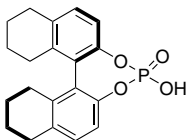
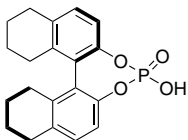
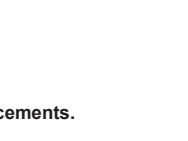
PHOSPHORUS (Compounds)

15-1373	(11bR)-2,6-Bis(3,5-dimethylphenyl)-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1065214-95-0) $C_{36}H_{37}O_4P$; FW: 564.7 Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1374	(11bS)-2,6-Bis(3,5-dimethylphenyl)-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) $C_{36}H_{37}O_4P$; FW: 564.7; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1395	(R)-3,3'-Bis2,4,6-triisopropylphenyl)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl-2,2'-diyl Hydrogenphosphate, 98%, (99% ee) (929294-27-9) $C_{50}H_{68}O_4P$; FW: 761; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1394	(S)-3,3'-Bis2,4,6-triisopropylphenyl)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl-2,2'-diyl Hydrogenphosphate, 98%, (99% ee) (878111-20-7) $C_{50}H_{68}O_4P$; FW: 761; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1392	(11bR)-4-Hydroxy-2,6-bis[4-(trifluoromethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 95%, (99% ee) (791616-59-6) $C_{34}H_{19}F_6O_4P$; FW: 636.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1393	(11bS)-4-Hydroxy-2,6-bis[4-(trifluoromethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 95%, (99% ee) (1264573-23-0) $C_{34}H_{19}F_6O_4P$; FW: 636.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1381	(11bR)-4-Hydroxy-2,6-bis[2,4,6-tris(1-methylethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (791616-63-2) $C_{50}H_{57}O_4P$; FW: 753; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg

PHOSPHORUS (Compounds)

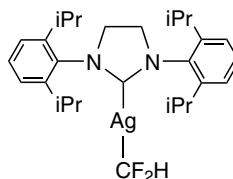
15-1382	(11bS)-4-Hydroxy-2,6-bis[2,4,6-tris(1-methylethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphhepin, 98%, (99% ee) (874948-63-7) C₆₀H₆₇O₄P; FW: 753; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
15-1388	(11bR)-4-Hydroxy-2,6-di-1-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphhepin, 98%, (99% ee) (864943-23-7) C₄₀H₂₆O₄P; FW: 600.6; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only. 	100mg
15-1389	(11bS)-4-Hydroxy-2,6-di-1-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphhepin, 98%, (99% ee) (929097-93-8) C₄₀H₂₆O₄P; FW: 600.6; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
15-1390	(11bR)-4-Hydroxy-2,6-di-2-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphhepin, 98%, (99% ee) (791616-56-3) C₄₀H₂₆O₄P; FW: 600.6; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only. 	100mg
15-1391	(11bS)-4-Hydroxy-2,6-di-2-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphhepin, 98%, (99% ee) (874948-60-4) C₄₀H₂₆O₄P; FW: 600.6; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
15-1386	(11bR)-4-Hydroxy-2,6-diphenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphhepin, 98%, (99% ee) (695162-86-8) C₃₂H₂₁O₄P; FW: 500.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only. 	100mg
15-1387	(11bS)-4-Hydroxy-2,6-diphenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphhepin, 98%, (99% ee) (874948-59-1) C₃₂H₂₁O₄P; FW: 500.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg

PHOSPHORUS (Compounds)

15-1383	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-1-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) <i>(1242066-20-1)</i> $C_{40}H_{33}O_4P$; FW: 608.7; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1384	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-1-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) $C_{40}H_{33}O_4P$; FW: 608.7; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1378	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-2-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) <i>(922711-75-9)</i> $C_{40}H_{33}O_4P$; FW: 608.7; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1379	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-2-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) $C_{40}H_{33}O_4P$; FW: 608.7; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1396	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-diphenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) <i>(791616-65-4)</i> $C_{32}H_{29}O_4P$; FW: 508.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1397	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-diphenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) <i>(945852-48-2)</i> $C_{32}H_{29}O_4P$; FW: 508.5; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1370	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) <i>(297752-25-1)</i> $C_{20}H_{21}O_4P$; FW: 356.4; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-1371	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) <i>(1193697-61-8)</i> $C_{20}H_{21}O_4P$; FW: 356.4; White to light-yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg

SILVER (Compounds)

47-2575 **[1,3-Bis[2,6-bis(i-propyl)phenyl]-2-imidazolidinylidene]difluoromethylsilver(I)**
 $C_{28}H_{40}AgF_2N_2$; FW: 550.50
air sensitive



100mg
500mg

SODIUM (Compounds)

11-1146 **Sodium hexafluorophosphate 99% (99.99%-Na) PURATREM**
 (21324-39-0)
 F_6NaP ; FW: 167.95; white powdr.; d. 2.37
moisture sensitive, hygroscopic

2g
10g

11-1015 **Sodium tetrakis(4-fluorophenyl)borate dihydrate, 97% (207683-22-5)**
 $C_{24}H_{20}BF_4NaO_2$; FW: 414.18(450.21); white xtl.

250mg
1g
5g

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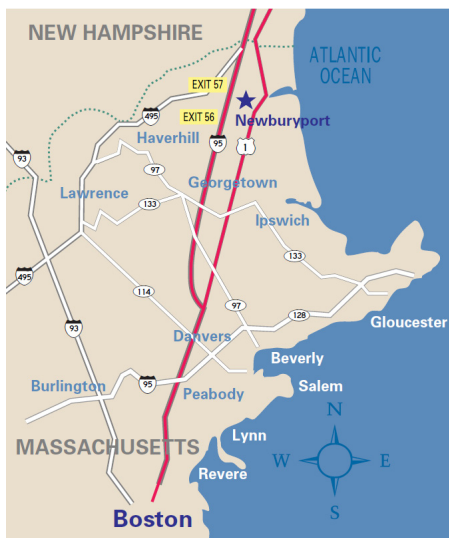
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Enlarged maps are available on our website.

About Our Cover

Cover art by Lisa Bohnwagner - selected pieces from her solo show "Elemental" - the periodic table of the elements created from 71 six inch square paintings.

Lisa explains, "After back surgery my world and what I could do became extremely limited. It caused me to

think about what is truly elemental to life. Part of that, for me, is art. The elements and their various combinations are the bulding blocks of life and enable us not only to live, but to live a creative life."

Lisa's paintings are collected world-wide. To purchase element paintings (individually or as a group) please visit her web site: www.lisabohnwagner.com or contact her directly: lisa@lisabohnwagner.com

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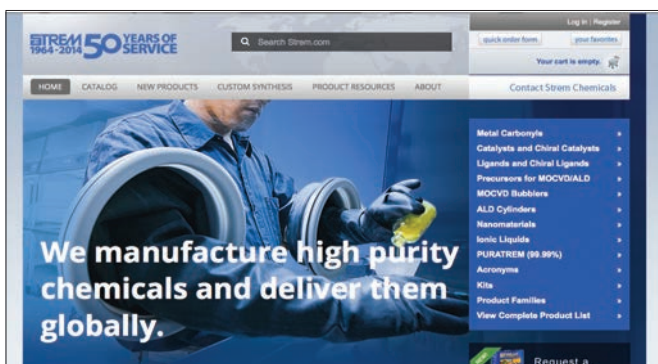
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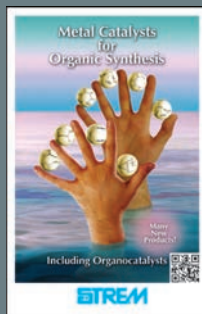
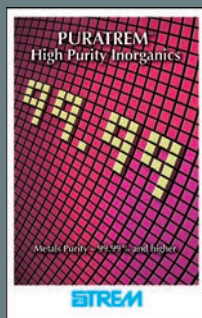
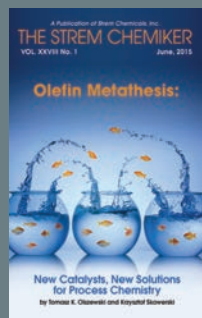
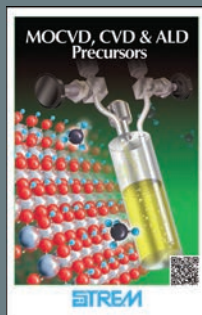
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