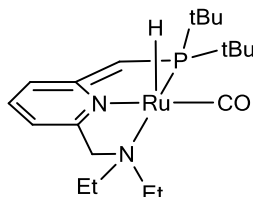
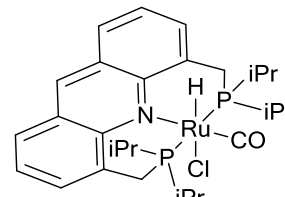


**44-0081**



**44-0091**



**44-0525**

**44-0081** Carbonylchlorohydrido[6-(di-t-butylphosphinomethyl)-2-(N,N-diethylaminomethyl)pyridine]ruthenium(II), min. 98% (Milstein Catalyst Precursor) [863971-62-4]

C<sub>20</sub>H<sub>36</sub>ClN<sub>2</sub>OPRu; FW: 488.01; pale yellow solid

air sensitive

Note: Air-stable in the solid state for several days, but best stored under an inert atmosphere.

100mg  
500mg

Technical Note:

1. See 44-0091.

**44-0091** Carbonylhydrido[6-(di-t-butylphosphinomethylene)-2-(N,N-diethylaminomethyl)-1,6-dihydropyridine]ruthenium(II), min. 98% Milstein Catalyst [863971-63-5]

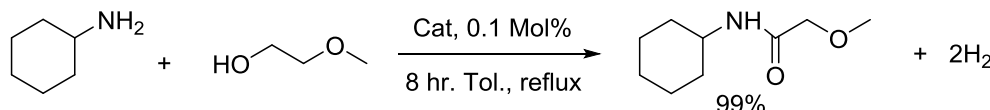
C<sub>20</sub>H<sub>35</sub>N<sub>2</sub>OPRu; FW: 451.55; red-black solid

air sensitive, (store cold)

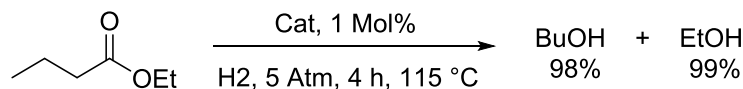
100mg  
500mg

Technical Notes:

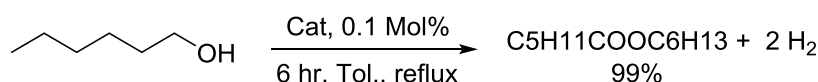
1. Ruthenium catalyst for the direct synthesis of amides from alcohols and primary amines.
2. Ruthenium catalyst for the hydrogenation of esters in high yields under mild pressure and neutral conditions.
3. Ruthenium catalyst for the dehydrogenative coupling of alcohols to form esters in high yields under neutral conditions.
4. Ruthenium catalyst for the synthesis of amides from esters and amines with liberation of hydrogen gas.
5. Ruthenium catalyst for the hydrogenation of 3-methyl-2-oxalidinone



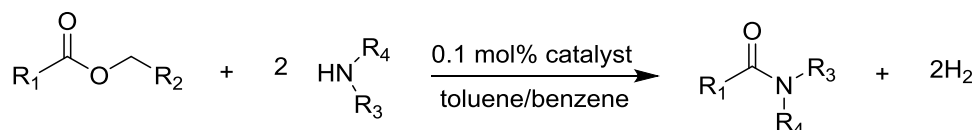
Tech. Note (1)  
Ref. (1)



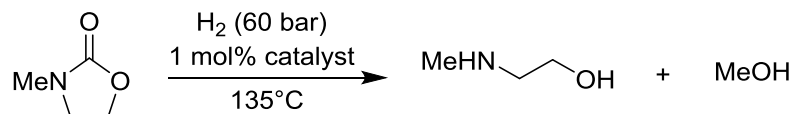
Tech. Note (2)  
Ref. (2)



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



Tech. Note (4)  
Ref. (5)



Tech. Note (5)  
Ref. (6)

References:

1. *Science*, **2007**, 317, 790.
2. *Angew. Chem. Int. Ed.*, **2006**, 45, 1113.
3. *J. Am. Chem., Soc.*, **2005**, 127, 12429
4. *J. Am. Chem., Soc.*, **2005**, 127, 10840.
5. *J. Am. Chem., Soc.*, **2011**, 133, 1682.
6. *ACS Catal.*, **2015**, 5, 2416.

Visit [www.strem.com](http://www.strem.com) for new product information and searchable catalog.

**Strem Chemicals, Inc.**  
7 Mulliken Way  
Newburyport, MA 01950-4098  
U.S.A.  
Tel.: (978) 499-1600  
Fax: (978) 465-3104  
Email: [info@strem.com](mailto:info@strem.com)

**Strem Chemicals, Inc.**  
15, rue de l'Atome  
Zone Industrielle  
67800 BISCHHEIM France  
Tel.: (33) 03 88 62 52 60  
Fax: (33) 03 88 62 26 81  
Email: [info.europe@strem.com](mailto:info.europe@strem.com)

**Strem Chemicals, Inc.**  
Postfach 1215  
77672 KEHL  
Germany  
Telefon: 0 78 51/ 7 58 79  
Email: [info.europe@strem.com](mailto:info.europe@strem.com)

**Strem Chemicals UK, Ltd.**  
An Independent Distributor of Strem Chemicals Products  
Newton Hall, Town Street  
Newton, Cambridge, UK CB22 7ZE  
Tel.: 0845 643 7263  
Fax: 0845 643 7362  
Email: [enquiries@strem.co.uk](mailto:enquiries@strem.co.uk)

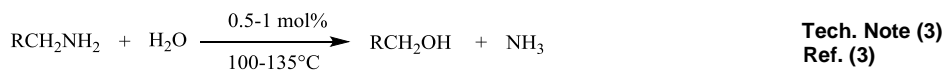
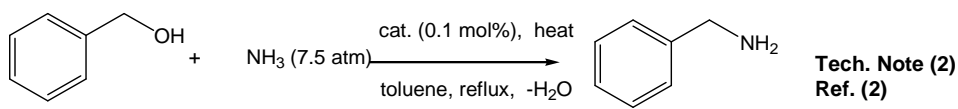
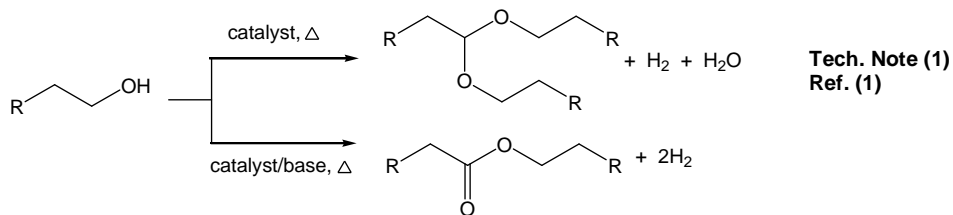
**44-0525 Chlorocarbonylhydrido[4,5-bis-(di-i-propylphosphinomethyl)acridine]ruthenium(II), min.98%****Milstein Acridine Catalyst** [1101230-25-4]C<sub>28</sub>H<sub>40</sub>ClN<sub>2</sub>OP<sub>2</sub>Ru; FW: 605.09; orange solid*air sensitive*

Note: Patents: US provisional 61/087,708, PCT/IL2009/000778.

25mg  
100mg

## Technical Notes:

- Useful ruthenium catalyst for the direct conversion of alcohols to acetals and esters.
- Useful ruthenium catalyst for the selective synthesis of amines directly from alcohols and ammonia.
- Catalyst used in the direct amination of primary amines by water to produce alcohols.



## References:

- J. Am. Chem. Soc.*, **2009**, *131*, 3146.
- Angew. Chem. Int. Ed.*, **2008**, *47*, 8661.
- Angew. Chem. Int. Ed.*, **2013**, *52*, 6269.

Also available P-N-P ligand **15-0415** used to make Acridine catalyst 44-0525.

Visit [www.strem.com](http://www.strem.com) for new product information and searchable catalog.

**Strem Chemicals, Inc.**  
7 Mulliken Way  
Newburyport, MA 01950-4098  
U.S.A.  
Tel.: (978) 499-1600  
Fax: (978) 465-3104  
Email: [info@strem.com](mailto:info@strem.com)

**Strem Chemicals, Inc.**  
15, rue de l'Atome  
Zone Industrielle  
67800 BISCHHEIM France  
Tel.: (33) 03 88 62 52 60  
Fax: (33) 03 88 62 26 81  
Email: [info.europe@strem.com](mailto:info.europe@strem.com)

**Strem Chemicals, Inc.**  
Postfach 1215  
77672 KEHL  
Germany  
Telefon: 0 78 51/ 7 58 79  
Email: [info.europe@strem.com](mailto:info.europe@strem.com)

**Strem Chemicals UK, Ltd.**  
An Independent Distributor of Strem Chemicals Products  
Newton Hall, Town Street  
Newton, Cambridge, UK CB22 7ZE  
Tel.: 0845 643 7263  
Fax: 0845 643 7362  
Email: [enquiries@strem.co.uk](mailto:enquiries@strem.co.uk)