MOFs (Metal Organic Frameworks) and Ligands for MOF Synthesis

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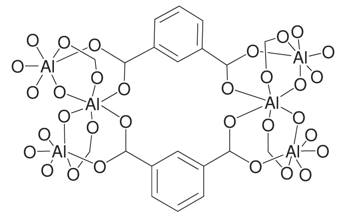
ALUMINUM (Compounds)

13-0300 **Aluminum hydroxide isophthalate MOF (CAU-10, Isophthalate:Al=0.9-1.0)** *(1416330-84-1)* — 500mg, 2g

$Al(OH)(C_8H_4O_4)_x$, X = 0.9-1.0; white solid; SA: 620-640; P.Vol. 0.23-0.27
Note: Particle size: 0.4-0.7 micron, Thermal stability: 400ºC, Activation temperature: 150ºC
Sold under license from Inven2 AS for research purposes only. PCT/GB2009/001087.



Technical Note:

1. MOF exhibits water adsorption characteristics which make it a promising adsorbent for application in heat-exchange processes (ref 1).

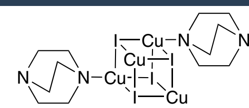
References:

1. *Water adsorption behaviour of CAU-10-H: a thorough investigation of its structure–property relationships,* J. Mater. Chem. A, **2016**, *4*, 11859, Dominik Frohlich, Evangelia Pantatsaki, Panagiotis D. Kolokathis, Karen Markey, Helge Reinsch, Max Baumgartner, Monique A. van der Veen, Dirk E. De Vos, Norbert Stock, George K. Papadopoulos, Stefan K. Henninger and Christoph Janiak
2. *Structures, Sorption Characteristics, and Nonlinear Optical Properties of a New Series of Highly Stable Aluminum MOFs*., Chem. Mater. **2013**, *25*, 17−26, Helge Reinsch, Monique A. van der Veen, Barbara Gil, Bartosz Marszalek, Thierry Verbiest, Dirk de Vos, and Norbert Stock

COPPER (Compounds)

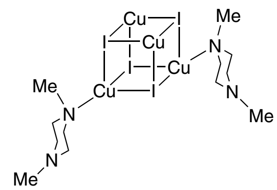
29-3015 **Bis(1,4-diazabicyclo [2.2.2]octane)tetra (copper(I) iodide) $(CuI)_4(DABCO)_2$** *(928170-42-7)* — 500mg, 2g

$C_{12}H_{24}Cu_4I_4N_4$; FW: 986.15; yellow pwdr.; SA: >514; P.Vol. 0.25
air sensitive



29-0550 **Bis(N,N'-dimethylpiperazine)tetra[copper(I) iodide], 98% MOF** *(1401708-91-5)* — 500mg, 2g

$(CuI)_4(C_6H_{14}N_2)_2$; FW: 990.18; white pwdr.
moisture sensitive, (store cold)



Technical Note:

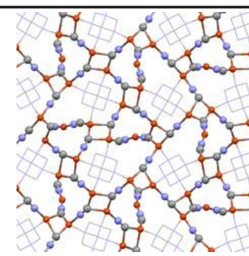
1. The copper iodide, N,N'dimethylpiperazine complex is a 3D photoluminescent, fairly open network, with a lamda max excitation of 321 nm and a lamda max emission of 525nm.

References:

1. *Dalton Trans.*, **2012**, *41*, 11663

29-0565 **(Hexamethylenetetramine)penta[copper(I) cyanide], 98% MOF** *(1042093-98-0)* — 500mg, 2g

$C_6H_{12}N_4(CuCN)_5$; FW: 588.00; white pwdr.
hygroscopic, (store cold)



Technical Note:

1. The copper cyanide hexamethylenetetramine complex is a 3D photoluminescent, very densely-packed, network of tetradentate ligands with a lamda max excitation of 282 and 304nm, and a lamda max emission of 417 and 522nm.

References:

1. *Inorg. Chem.*, **2007**, *46*, 8897
2. *Inorg. Chem.*, **2008**, *47*, 6947
3. *Inorg. Chem. Acta.*, **2010**, *364*, 102
4. *Dalton Trans.*, **2012**, *41*, 11663

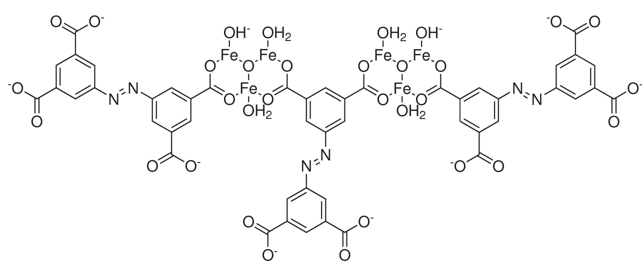
IRON (Compounds)

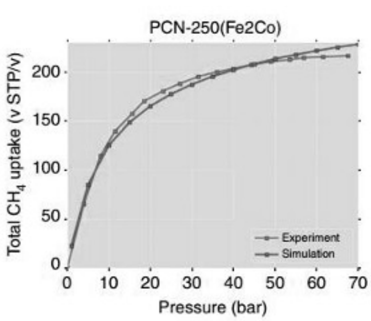
26-3725 **Iron azobenzene tetracarboxylic, Porous [PCN-250(Fe)], CONEKTIC™ F250** *(1771755-22-6)* — 500mg, 2g, 10g

Dark red-brown pwdr.
Note: Sold in collaboration with framergy for research purposes only. PCT/GB2014/053506

Technical Note:

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





References:

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

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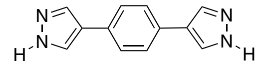
IRON (Compounds)

26-2340 **Iron(III) 1,3,5-benzenetricarboxylate hydrate, porous (F-free MIL-100(Fe), KRICT F100) [Iron trimesate]** *(1257379-83-1)*
$[Fe_3O(H_2O)_2(OH)\{C_6H_3(COO)_3\}_2]\cdot XH_2O$; red solid; SA: 2120 (Langmuir); 1950 (BET); P.Vol. 1075
Note: Sold under agreement with KRICT for research and development purposes only.
Patents US 8507399 B2, US 8252950 B2.

500mg
2g

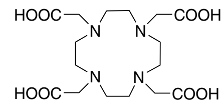
NITROGEN (Compounds)

07-0435 **1,4-Di(4'-pyrazolyl)benzene, min. 97% H_2BDP** *(1036248-62-0)*
$C_{12}H_{10}N_4$; FW: 210.24; pale yellow solid
Note: Ligand for MOF synthesis.



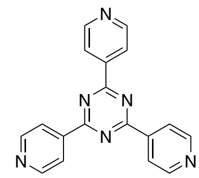
500mg
2g

07-1942 **1,4,7,10-Tetraazacyclododecane-N,N',N",N"'-tetraacetic acid, min. 98% DOTA** *(60239-18-1)*
$C_{16}H_{28}N_4O_8$; FW: 404.42; white pwdr.
Note: Ligand for MOF synthesis.



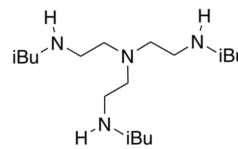
250mg
1g
5g

07-3235 **2,4,6-(Tri-4-pyridinyl)-1,3,5-triazine, min. 97% TPT** *(42333-78-8)*
$C_{18}H_{12}N_6$; FW: 312.33; off-white pwdr.
Note: Ligand for MOF synthesis



250mg
1g
5g

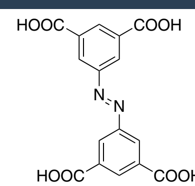
07-3110 **Tris(isobutylaminoethyl)amine, min 97%** *(331465-73-7)*
$C_{18}H_{42}N_4$; FW: 314.55; colorless to pale yellow, viscous liq.
hygroscopic
Note: Ligand for MOF synthesis.



500mg
2g

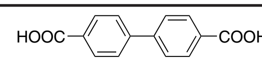
OXYGEN (Compounds)

08-0125 **3,3',5,5'-Azobenzene tetracarboxylic acid, TazbH$_4$, 97%** *(365549-33-33)*
$C_{16}H_{10}N_2O_8$; FW: 358.26; yellow-orange pwdr.
Note: Ligand for MOF Synthesis



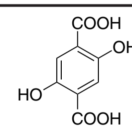
1g
5g

08-0175 **[1,1'-Biphenyl]-4,4'-dicarboxylic acid, min. 98%** *(787-70-2)*
$C_{14}H_{10}O_4$; FW: 242.23; white to pale-yellow solid
Note: Ligand for MOF synthesis.



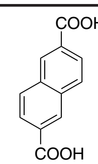
5g
25g

08-1220 **2,5-Dihydroxyterephthalic acid, 98% H_4DOBDC** *(610-92-4)*
$C_6H_2(OH)_2(COOH)_2$; FW: 198.13; yellow pwdr.
Note: Ligand for MOF Synthesis



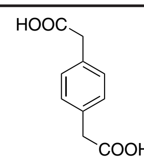
1g
5g
25g

08-1235 **2,6-Naphthalenedicarboxylic acid, min. 98%** *(1141-38-4)*
$C_{10}H_6(COOH)_2$; FW: 216.19; white pwdr.; m.p. >300°
Note: Ligand for MOF synthesis.



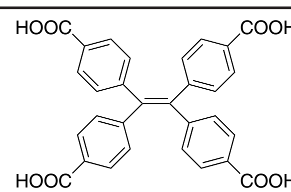
5g
25g

08-1165 **1,4-Phenylenediacetic acid, 97%** *(7325-46-4)*
$C_6H_4(CH_2COOH)_2$; FW: 194.18; white to off-white solid
Note: Ligand for MOF synthesis.



1g
5g

08-3060 **1,1,2,2-Tetra(4-carboxylphenyl)ethylene, 99% H_4TCPE** *(1351279-73-6)*
$C_{30}H_{20}O_8$; FW: 508.48; pale yellow pwdr.
Note: Ligand for MOF synthesis.



25mg
100mg

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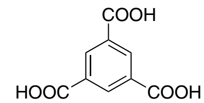
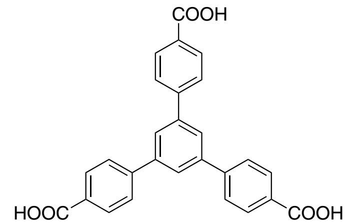
OXYGEN (Compounds)

08-0195 **1,3,5-Tricarboxybenzene, min. 95% (Trimesic acid) BTC** *(554-95-0)*
$C_6H_3(COOH)_3$; FW: 210.14; white pwdr.
Note: Ligand for MOF synthesis.



50g
250g

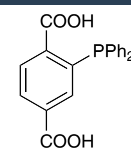
08-0635 **1,3,5-Tris(4-carboxyphenyl)benzene, min. 98% BTB** *(50446-44-1)*
$C_{27}H_{18}O_6$; FW: 438.43; white to yellow solid; m.p. 322-327°
Note: Ligand for MOF synthesis.



1g
5g

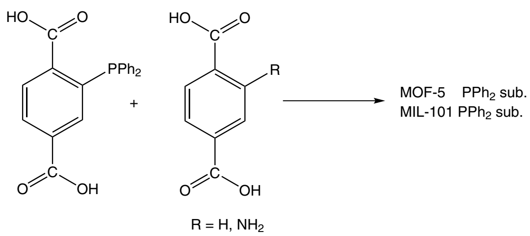
PHOSPHORUS (Compounds)

15-7170 **2-(Diphenylphosphino)terephthalic acid, 98%** *(1537175-69-1)*
$C_{20}H_{18}O_4P$; FW: 350.30; white pwdr.
Note: Ligand for MOF synthesis. Developed at the Paul Scherrer Institute, Switzerland PCT/EP2013/051405.



50mg
250mg

Technical Note:
1. Starting material for the construction of diphenylphosphino-substituted MOFs.



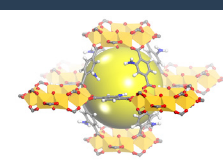
Tech. Note (1)
Ref. (1)

References:

1. *Ind. Eng. Chem. Res.*, **2014**, *53*, 9120.

TITANIUM (Compounds)

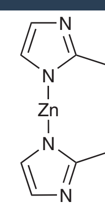
22-1070 **Hexakis[μ-(2-amino-1,4-benzenedicarboxylato)][tetra-μ-hydroxyocta-μ-oxooctatitanium], NH2-MIL-125(Ti), CONEKTIC™ T125** *(1309760-94-8)*
$C_{48}H_{34}N_6O_{36}Ti_8$; FW: 1653.74; yellow pwdr.; SA: ~1530; P.Vol. ~0.74
Note: Sold in collaboration with framergy for research purposes only.
Patents: US8940392; EP2398812; JP5850750; KR101732623; CA2750746.



250mg
1g

ZINC (Compounds)

30-4015 **Zinc 2-methylimidazole MOF (ZIF-8)** *(59061-53-9)*
HAZ $C_8H_{10}N_4Zn$; FW: 227.58; white solid; SA: 1813; P.Vol. 0.65



1g
5g

Technical Notes:
1. Use of ZIF-8 in the separation of alkanes, alkenes and aromatics
   a. Separation of xylene isomers
      Micropor. Mesopor. Mat., **2013**, *173*, 1.
   b. Separation of C6 Paraffins
      Ind. Eng. Chem. Res., **2012**, *51*, 4692.
   c. Effective separation of propylene/propane binary mixtures
      J. Membrane Sci., **2012**, *390-391*, 93.
2. Use of ZIF-8 as a catalyst and catalyst-support
   a. Catalytic activity of ZIF-8 in the synthesis of styrene carbonate
      Chem. Commun., **2013**, *32*, 36.
   b. Iridium nanoparticles stabilized by metal organic frameworks: synthesis, structural properties and catalytic performance
      Dalton Trans., **2012**, *41*, 12690.
   c. Zeolitic imidazole frameworks: Catalysts in the conversion of carbon dioxide to chloropropene carbonate
      ACS Catalysis, **2012**, *2*, 180.
   d. Expanding applications of metal-organic frameworks: zeolite imidazolate framework ZIF-8 as an efficient heterogeneous catalyst for the Knoevenagel reaction
      ACS Catalysis, **2011**, *1*, 120.
3. Use of ZIF-8 in gas purification
   a. MOF-containing mixed-matrix membranes for CO_2/CH_4 and CO_2/N_2 binary gas mixture separations
      Sep. Purif. Technol., **2011**, *81*, 31.
   b. Porous polyethersulfone-supported Zeolitic Imidazolate Framework Membranes for hydrogen separation

J. Phys.Chem. C., **2012**, *116*, 13264.

ZIRCONIUM (Compounds)

40-1109 **Zirconium aminobenzenedicarboxylate MOF (UiO-66-BDC-NH2, BDC-NH2:Zr=0.9-1.0)** *(1260119-00-3)* 500mg 2g

$Zr_6O_4(OH)_4(C_8H_5NO_4)_x$, X = 5.4-6.0; yellow solid; SA: 800-850; P.Vol. 0.31-0.35

Note: Particle size: 0.1-0.5 micron, Thermal stability: 300ºC, Activation temperature: 150ºC

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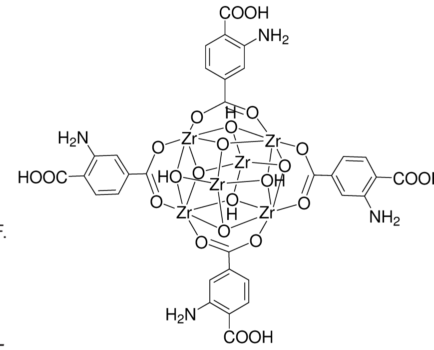

Technical Notes:

1. Useful MOF for adsorption of CO_2 applications (ref 1).
2. Catalyst MOF used in the conversion of toxic agents to non-toxic products (ref 2).

References:

1. *Carbon Dioxide Adsorption in Amine-Functionalized Mixed-Ligand Metal-Organic Frameworks of UiO-66 Topology.,* Chem.Sus.Chem. **2014**, *7*, 3382-3388, Ethiraj, J. Albanese, E. Civalleri, B. Vitillo, J. G. Bonino, F. Chavan, S. Shearer, G. C. Lillerud, K. P. Bordiga, S.
2. *Tailoring the Pore Size and Functionality of UiO-Type Metal−Organic Frameworks for Optimal Nerve Agent Destruction,* Inorg. Chem. **2015**, *54*, 9684−9686, Gregory W. Peterson, Su-Young Moon, George W. Wagner, Morgan G. Hall, Jared B. DeCoste, Joseph T. Hupp, and Omar K. Farha
3. *Towards Metal-Organic Framework based Field Effect Chemical Sensors: UiO-66-NH2 for Nerve Agent Detection,* Chem. Sci., **2016**, *7*, 5827, Ivo Stassen, Bart Bueken, Helge Reinsch, Jos Oudenhoven, Daan Wouters, Julianna Hajek, Veronique Van Speybroeck, Norbert Stock, Philipe M. Vereecken, Rob Van Schaijk, Dirk De Vos and Rob Ameloot

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40-1108 **Zirconium benzenedicarboylate MOF (UiO-66-BDC, BDC:Zr=0.66-0.98)** 500mg 2g

$Zr_6O_4(OH)_4(C_8H_4O_4)_x$ X = 3.96-5.88; white solid; SA: 1050-1400; P.Vol. 0.42-0.58

Note: Particle size: 0.2-0.5 micron, Thermal stability: 400ºC, Activation temperature: 300ºC

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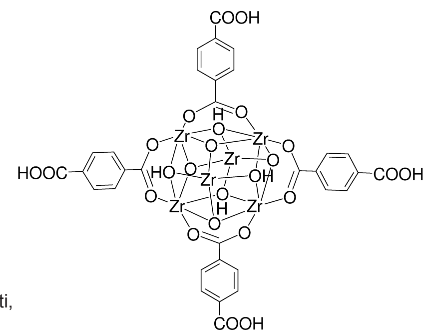

Technical Note:

1. New zirconium-based inorganic building brick that allows the synthesis of very high surface area MOF's with unprecedented stability (ref 3).

References:

1. *Tuned to Perfection: Ironing Out the Defects in Metal−Organic Framework UiO-66* Chem. Mater. **2014**, *26*, 4068−4071, Greig C. Shearer, Sachin Chavan, Jayashree Ethiraj, Jenny G. Vitillo, Stian Svelle, Unni Olsbye, Carlo Lamberti, Silvia Bordiga and Karl Petter Lillerud
2. *H_2 storage in isostructural UiO-67 and UiO-66 MOFs* Phys. Chem. Chem. Phys., **2012**, *14*, 1614–1626, Sachin Chavan, Jenny G. Vitillo, Diego Gianolio, Olena Zavorotynska, Bartolomeo Civalleri, Søren Jakobsen, Merete H. Nilsen, Loredana Valenzano, Carlo Lamberti, Karl Petter Lillerud and Silvia Bordiga
3. *A New Zirconium Inorganic Building Brick Forming Metal Organic Frameworks with Exceptional Stability*. J. Am. Chem. Soc. **2008**, *130*, 13850–13851, Jasmina Hafizovic Cavka, Søren Jakobsen, Unni Olsbye, Nathalie Guillou, Carlo Lamberti, Silvia Bordiga, and Karl Petter Lillerud

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40-1112 **Zirconium biphenyldicarboxylate MOF (UiO-66-BPDC/UiO-67, BPDC:Zr=0.9-1.0)** 250mg 1g

$Zr_6O_4(OH)_4(C_{14}H_8O_4)_x$, X = 5.4-6.0; white solid; SA: 2400-2500; P.Vol. 0.85-0.98 cm^3/g

moisture sensitive

Note: Particle size: 0.4-0.7 cm^3/g, Thermal stability: 450ºC

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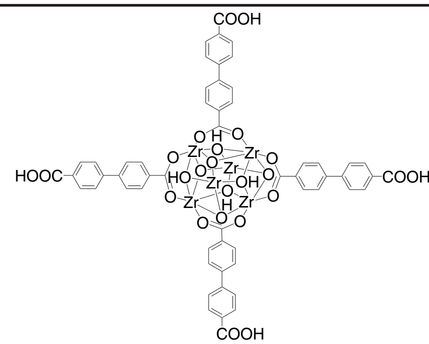

Technical Notes:

1. Metal−organic framework showing excellent stability to water, reversible water vapor adsorption, and increased volumetric capacity for methane adsorption (ref 1)
2. Remarkable stability at high temperatures, high pressures and in the presence of different solvents, acids and bases (refs 2-3).

References:

1. *UiO-67-type Metal−Organic Frameworks with Enhanced Water Stability and Methane Adsorption Capacity*, Inorg. Chem. **2016**, *55*, 1986−1991, Sigurd Øien-Ødegaard, Boris Bouchevreau, Knut Hylland, Lianpao Wu, Richard Blom, Carlos Grande, Unni Olsbye, Mats Tilset, and Karl P. Lillerud.
2. *H_2 storage in isostructural UiO-67 and UiO-66 MOFs*, Phys. Chem. Chem. Phys., **2012**, *14*, 1614–1626, Sachin Chavan, Jenny G. Vitillo, Diego Gianolio, Olena Zavorotynska, Bartolomeo Civalleri, Søren Jakobsen, Merete H. Nilsen, Loredana Valenzano, Carlo Lamberti, Karl Petter Lillerud and Silvia Bordiga
3. *A New Zirconium Inorganic Building Brick Forming Metal Organic Frameworks with Exceptional Stability.* J. Am. Chem. Soc. **2008**, *130*, 13850–13851, Jasmina Hafizovic Cavka, Søren Jakobsen, Unni Olsbye, Nathalie Guillou, Carlo Lamberti, Silvia Bordiga, and Karl Petter Lillerud.

40-1105 **Zirconium 1,4-dicarboxybenzene MOF (UiO-66, BDC:Zr=1)** *(1072413-89-8)* 500mg 2g

$C_{48}H_{28}O_{32}Zr_6$; FW: 1664.06; white pwdr.; SA: 1180-1240m^2g; P.Vol. 0.45-0.48

Note: Particle size: 0.2-0.5 micron, Thermal stability: 400ºC, Activation temperature: 300ºC

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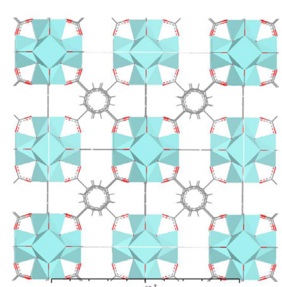

Technical Note:

1. New zirconium-based inorganic building brick that allows the synthesis of very high surface area MOF's with unprecedented stability (ref 3).

References:

1. *Tuned to Perfection: Ironing Out the Defects in Metal−Organic Framework UiO-66* Chem. Mater. **2014**, *26*, 4068−4071, Greig C. Shearer, Sachin Chavan, Jayashree Ethiraj, Jenny G. Vitillo, Stian Svelle, Unni Olsbye, Carlo Lamberti, Silvia Bordiga and Karl Petter Lillerud
2. *H_2 storage in isostructural UiO-67 and UiO-66 MOFs* Phys. Chem. Chem. Phys., **2012**, *14*, 1614–1626, Sachin Chavan, Jenny G. Vitillo, Diego Gianolio, Olena Zavorotynska, Bartolomeo Civalleri, Søren Jakobsen, Merete H. Nilsen, Loredana Valenzano, Carlo Lamberti, Karl Petter Lillerud and Silvia Bordiga
3. *A New Zirconium Inorganic Building Brick Forming Metal Organic Frameworks with Exceptional Stability.* J. Am. Chem. Soc. **2008**, *130*, 13850–13851, Jasmina Hafizovic Cavka, Søren Jakobsen, Unni Olsbye, Nathalie Guillou, Carlo Lamberti, Silvia Bordiga, and Karl Petter Lillerud

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ZIRCONIUM (Compounds)

40-1114 **Zirconium Fumarate MOF (UiO-66-FA, FA:Zr=0.66-0.98)** 500mg 2g

$Zr_6O_4(OH)_4(C_4H_2O_4)_x$, X = 3.96-5.88; white solid; SA: 650-960; P.Vol. 0.26-0.4
Note: Particle size: 0.1-0.5 micron, Thermal stability: 200ºC, Activation temperature: 130ºC
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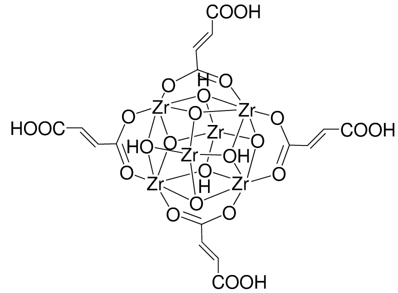

Technical Notes:
1. Metalorganic framework used in a large number of studies for the storage of hydrogen or methane (ref 2)
2. Water adsorption in MOF's for many applications such as dehumidification, thermal batteries, and delivery of drinking water in remote areas (ref 3)

References:
1. *Water harvesting from air with metal-organic frameworks powered by natural sunlight*. Science, **2017**, *356*, 430–434, Hyunho Kim, Sungwoo Yang, Sameer R. Rao, Shankar Narayanan, Eugene A. Kapustin, Hiroyasu Furukawa, Ari S. Umans, Omar M. Yaghi, Evelyn N. Wang
2. *A Facile "Green" Route for Scalable Batch Production and Continuous Synthesis of Zirconium MOFs.* Eur. J. Inorg. Chem. **2016**, 4490–4498. Helge Reinsch, Steve Waitschat, Sachin M. Chavan, Karl Petter Lillerud, and Norbert Stock
3. *Water Adsorption in Porous Metal−Organic Frameworks and Related Materials*, J. Am. Chem. Soc., **2014**, *136*, 4369−4381, Hiroyasu Furukawa, Felipe Gándara,Yue-Biao Zhang, Juncong Jiang, Wendy L. Queen, Matthew R. Hudson, and Omar M. Yaghi
4. *A water-born Zr-based porous coordination polymer: Modulated synthesis of Zr-fumarate MOF*. Microporous and mesoporous materials , **2015**, *203*,186-194, Schulze, H. A., Lippke, J., Konig, S., Sazama, U., Froba, M., Zahn, Gesa, Schulze, Hendrik Albert, Lippke, Jann, König, Sandra, Sazama, Uta, Fröba, Michael, Behrens, Peter

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40-1106 **Zirconium trans-1, 2-ethylenedicarboxylic acid MOF (UiO-66-FA, FA:Zr=1)** 500mg 2g

$Zr_6O_4(OH)_4(C_4H_2O_4)_6$; cream solid; SA: 720-770; P.Vol. 0.29-0.32
Note: Particle size: 0.1-0.5 micron, Thermal stability: 200ºC, Activation temperature: 150ºC
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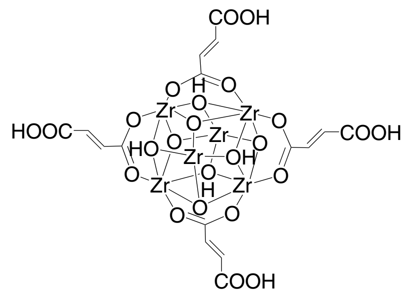

Technical Notes:
1. Metalorganic framework used in a large number of studies for the storage of hydrogen or methane (ref 2)
2. Water adsorption in MOF's for many applications such as dehumidification, thermal batteries, and delivery of drinking water in remote areas (ref 3)

References:
1. *Water harvesting from air with metal-organic frameworks powered by natural sunlight.* Science, **2017**, *356*, 430–434, Hyunho Kim, Sungwoo Yang, Sameer R. Rao, Shankar Narayanan, Eugene A. Kapustin, Hiroyasu Furukawa, Ari S. Umans, Omar M. Yaghi, Evelyn N. Wang
2. *A Facile "Green" Route for Scalable Batch Production and Continuous Synthesis of Zirconium MOFs.* Eur. J. Inorg. Chem. **2016**, 4490–4498. Helge Reinsch, Steve Waitschat, Sachin M. Chavan, Karl Petter Lillerud, and Norbert Stock
3. *Water Adsorption in Porous Metal−Organic Frameworks and Related Materials*, J. Am. Chem. Soc., **2014**, *136*, 4369−4381, Hiroyasu Furukawa, Felipe Gándara,Yue-Biao Zhang, Juncong Jiang, Wendy L. Queen, Matthew R. Hudson, and Omar M. Yaghi
4. *A water-born Zr-based porous coordination polymer: Modulated synthesis of Zr-fumarate MOF*. Microporous and mesoporous materials , **2015**, *203*,186-194, Schulze, H. A., Lippke, J., Konig, S., Sazama, U., Froba, M., Zahn, Gesa, Schulze, Hendrik Albert, Lippke, Jann, König, Sandra, Sazama, Uta, Fröba, Michael, Behrens, Peter

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40-1111 **Zirconium trimellitate MOF (UiO-66-BDC-COOH, BDC-COOH:Zr=0.9-1.0)** 500mg 2g

$Zr_6O_4(OH)_4(C_9H_4O_6)_x$, X = 5.4-6.0; white solid; SA: 550-600; P.Vol. 0.25-0.27
Note: Particle size: 0.2-0.5 micron, Thermal stability: 350ºC, Activation temperature: 150ºC
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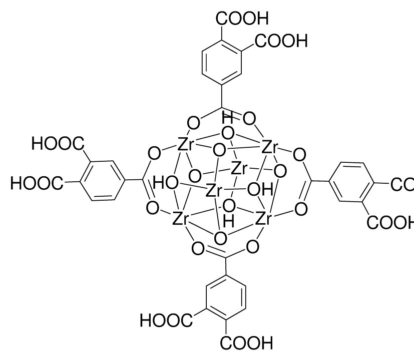

Technical Notes:
1. MOF for which the introduction of copper markedly increases ammonia adsorption capacities (ref 1)
2. Functionalized forms show the highest selectivity, good working capacity and medium ranged CO_2 adsorption enthalpy that make these materials very promising for physi-sorption-based processes(ref 2)

References:
1. *Engineering Copper Carboxylate Functionalities on Water Stable Metal−Organic Frameworks for Enhancement of Ammonia Removal Capacities*. J. Phys. Chem. C, **2017**, *121*, 3310−3319, Jayraj N. Joshi, Erika Y. Garcia-Gutierrez, Colton M. Moran, Jacob I. Deneff, and Krista S. Walton
2. *Functionalizing porous zirconium terephthalate UiO-66(Zr) for natural gas upgrading: a computational exploration.,* Chem. Commun., **2011**, *47*, 9603–9605, Qingyuan Yang, Andrew D. Wiersum, Philip L. Llewellyn, Vincent Guillerm, Christian Serre and Guillaume Maurin.