MOFs (Metal Organic Frameworks) and Ligands for MOF Synthesis

ALUMINUM (Compounds)

13-0300  Aluminum hydroxy isophthalate MOF (CAU-10, Isophthalate:Al=0.9-1.0) (1416330-84-1)
Al(OH)(C_6H_4O_2)_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:

COPPER (Compounds)

29-3015  Bis(1,4-diazabicyclo[2.2.2]octane)tetra(copper(I) iodide) (CuI)(DABCO), (928170-42-7)
[C_6H_14Cu_2N_4], FW: 986.15; yellow powdr.; SA: >514; P.Vol. 0.25
air sensitive

29-0550  Bis(N,N’-dimethylpiperazine)tetra[copper(I) iodide], 98% MOF (1401708-91-5)
(CuI)(C_6H_14N_4), FW: 990.18; white powdr.
mixture sensitive, (store cold)

Technical Note:
1. The copper iodide, N,N’-dimethylpiperazine complex is a 3D photoluminescent, fairly open network, with a lambda max excitation of 282 nm and a lambda max emission of 304nm.

References:
1. Dalton Trans., 2012, 41, 11663

29-0565  (Hexamethylenetetramine)penta(copper(I) cyanide), 98% MOF (1042093-98-0)
[C_6H_14N_4(CuCN)], FW: 588.00; white powdr.
ydroscopic, (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

IRON (Compounds)

26-3725  Iron azobenzene tetracarboxylic, Porous [PCN-250(Fe)], CONEKTIC™ F250 (1771755-22-6)
Dark red-brown powdr.
Note: Sold in collaboration with framergy for research purposes only. PCT/GB2014/053506

Technical Note:

References:

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Strem Chemicals, Inc.
7 Mulliken Way
Newburyport, MA 01950
U.S.A
Tel: 978.499.1600
Fax: 978.465.3104
Email: info@strem.com
### Iron (Compounds)

#### 26-2340

Iron(III) 1,3,5-benzenetricarboxylate hydrate, porous (F-free MIL-100(Fe), KRICT F100) [Iron trimesate]

(1257379-83-1)

\[\text{Fe}_3\text{O} (\text{H}_2\text{O})_2 \{\text{C}_6\text{H}_3(\text{COO})_3\} \cdot \text{XH}_2\text{O} \]

Red solid; SA: 1210 (Langmuir); 1950 (BET); P.Vol. 1075

Note: Sold under agreement with KRICT for research and development purposes only.


#### 07-0435

1,4-Di(4'-pyrazolyl)benzene, min. 97% H$_2$BDP (103654-62-0)

\[\text{C}_{12}\text{H}_{10}\text{N}_4\]; FW: 210.24; pale yellow solid

Note: Ligand for MOF synthesis.

#### 07-1942

1,4,7,10-Tetraazacyclododecan-N,N',N'',N'''-tetraacetic acid, min. 98% DOTA (130055-18-1)

\[\text{C}_{16}\text{H}_{28}\text{N}_4\text{O}_8\]; FW: 404.42; white powder

Note: Ligand for MOF synthesis.

#### 07-3235

2,4,6-(Tri-4-pyridinyl)-1,3,5-triazine, min. 97% TPT (42333-78-8)

\[\text{C}_{18}\text{H}_{12}\text{N}_6\]; FW: 312.33; off-white powder

Note: Ligand for MOF synthesis.

#### 07-3110

Tris(isobutylaminoethyl)amine, min 97%

\[\text{C}_{18}\text{H}_{42}\text{N}_4\]; FW: 314.55; colorless to pale yellow, viscous liquid.

Note: Ligand for MOF synthesis.

### Nitrogen (Compounds)

#### 08-0125

3,3',5,5'-Azobenzene tetracarboxylic acid, TazbH$_4$, 97%

\[\text{C}_{16}\text{H}_{10}\text{N}_2\text{O}_8\]; FW: 358.26; yellow-orange powder

Note: Ligand for MOF synthesis.

#### 08-0175

[1,1'-Biphenyl]-4,4'-dicarboxylic acid, min. 98%

\[\text{C}_{14}\text{H}_{10}\text{O}_4\]; FW: 242.23; white to pale yellow solid

Note: Ligand for MOF synthesis.

#### 08-1220

2,5-Dihydroxyterephthalic acid, 98% H$_4$DOBDC

\[\text{C}_6\text{H}_2(\text{OH})_2(\text{COOH})_2\]; FW: 198.13; yellow powder

Note: Ligand for MOF synthesis.

#### 08-1235

2,6-Naphthalenedicarboxylic acid, min. 98%

\[\text{C}_{10}\text{H}_6(\text{COOH})_2\]; FW: 216.19; white powder; m.p. >300°

Note: Ligand for MOF synthesis.

#### 08-1165

1,4-Phenylenediacetic acid, 97%

\[\text{C}_6\text{H}_4(\text{CH}_2\text{COOH})_2\]; FW: 194.18; white to off-white solid

Note: Ligand for MOF synthesis.

#### 08-3060

1,1,2,2-Tetra(4-carboxylphenyl)ethylene, 99% H$_4$TCPE

\[\text{C}_{30}\text{H}_{20}\text{O}_8\]; FW: 508.48; pale yellow powder

Note: Ligand for MOF synthesis.

### Oxygen (Compounds)

#### 08-125

3,3',5,5'-Azobenzene tetracarboxylic acid, TazbH$_4$, 97%

\[\text{C}_{16}\text{H}_{10}\text{N}_2\text{O}_8\]; FW: 358.26; yellow-orange powder

Note: Ligand for MOF synthesis.

#### 08-0175

[1,1'-Biphenyl]-4,4'-dicarboxylic acid, min. 98%

\[\text{C}_{14}\text{H}_{10}\text{O}_4\]; FW: 242.23; white to pale yellow solid

Note: Ligand for MOF synthesis.

#### 08-1220

2,5-Dihydroxyterephthalic acid, 98% H$_4$DOBDC

\[\text{C}_6\text{H}_2(\text{OH})_2(\text{COOH})_2\]; FW: 198.13; yellow powder

Note: Ligand for MOF synthesis.

#### 08-1235

2,6-Naphthalenedicarboxylic acid, min. 98%

\[\text{C}_{10}\text{H}_6(\text{COOH})_2\]; FW: 216.19; white powder; m.p. >300°

Note: Ligand for MOF synthesis.

#### 08-1165

1,4-Phenylenediacetic acid, 97%

\[\text{C}_6\text{H}_4(\text{CH}_2\text{COOH})_2\]; FW: 194.18; white to off-white solid

Note: Ligand for MOF synthesis.

#### 08-3060

1,1,2,2-Tetra(4-carboxylphenyl)ethylene, 99% H$_4$TCPE

\[\text{C}_{30}\text{H}_{20}\text{O}_8\]; FW: 508.48; pale yellow powder

Note: Ligand for MOF synthesis.
### OXYGEN (Compounds)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Formula</th>
<th>Molecular Weight</th>
<th>Physical Form</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>08-0195</td>
<td>1,3,5-Tricarboxybenzene, min. 95% (Trimesic acid) BTC</td>
<td>C₆H₃(COOH)₃</td>
<td>210.14</td>
<td>white powdr.</td>
<td>Ligand for MOF synthesis.</td>
</tr>
<tr>
<td>08-0635</td>
<td>1,3,5-Tris(4-carboxyphenyl)benzene, min. 98% BTB</td>
<td>C₂₇H₁₈O₆</td>
<td>438.43</td>
<td>yellow solid</td>
<td>Ligand for MOF synthesis.</td>
</tr>
</tbody>
</table>

### PHOSPHORUS (Compounds)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Formula</th>
<th>Molecular Weight</th>
<th>Physical Form</th>
<th>Notes</th>
</tr>
</thead>
</table>

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

### TITANIUM (Compounds)

<table>
<thead>
<tr>
<th>Code</th>
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<th>Formula</th>
<th>Molecular Weight</th>
<th>Physical Form</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>22-1070</td>
<td>Hexakis[μ-(2-amino-1,4-benzenedicarboxylato)][tetra-μ-hydroxyocta-μ-oxooctatitanium], NH₂-MIL-125(Ti), CONEKIT™ T125</td>
<td>C₄₈H₃₄N₆O₃₆Ti₈</td>
<td>1653.74</td>
<td>yellow powdr.; SA: ~1530; P.Vol. ~0.74</td>
<td>Sold in collaboration with framergy for research purposes only. Patent: US8940392; EP2398812; JP5850750; KR101732623; CA2790746.</td>
</tr>
</tbody>
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### ZINC (Compounds)

<table>
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<tr>
<th>Code</th>
<th>Description</th>
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<th>Molecular Weight</th>
<th>Physical Form</th>
<th>Notes</th>
</tr>
</thead>
</table>

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Zirconium aminobenzenedicarboxylate MOF (UIO-66-BDC-NH2, BDC-NH2:Zr=0.9-1.0)
\[
\text{Zr}_x\text{O}_{y}\text{(OH)}_z\text{(C}_6\text{H}_4\text{NH}_2)_w , \ X = 5.4-6.0; \text{ yellow solid;} \ SA: 800-850; \text{ P.Vol: 0.31-0.35} \\
\text{Note: Particle size: 0.1-0.5 micron, Thermal stability: 300°C, Activation temperature: 150°C} \\
\text{Sold under license from Inven2 AS for research purposes only. PCT/GB2009/001087.}
\]

References:

Zirconium benzenedicarboxylate MOF (UIO-66-BDC, BDC:Zr=0.66-0.98)
\[
\text{Zr}_x\text{O}_{y}\text{(OH)}_z\text{(C}_6\text{H}_4\text{O}_2)_w , \ X = 3.96-5.88; \text{ white solid;} \ SA: 1050-1400; \text{ P.Vol: 0.42-0.58} \\
\text{Note: Particle size: 0.2-0.5 micron, Thermal stability: 400°C, Activation temperature: 300°C} \\
\text{Sold under license from Inven2 AS for research purposes only. PCT/GB2009/001087.}
\]

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

Zirconium diphenyldicarboxylate MOF (UIO-66-BPDC/UIO-67, BPDC:Zr=0.9-1.0)
\[
\text{Zr}_x\text{O}_{y}\text{(OH)}_z\text{(C}_6\text{H}_4\text{O}_2)_w , \ X = 5.4-6.0; \text{ white solid;} \ SA: 2400-2500; \text{ P.Vol: 0.85-0.98 cm}^3\text{g}^{-1} \\
\text{moisture sensitive} \\
\text{Note: Particle size: 0.4-0.7 cm}^3\text{g}^{-1}, \text{Thermal stability: 450°C} \\
\text{Sold under license from Inven2 AS for research purposes only. PCT/GB2009/001087.}
\]

References:

Zirconium 1,4-dicarboxybenzene MOF (UIO-66, BDC:Zr=1)
\[
\text{C}_6\text{H}_4\text{O}_2\text{Zr}, \text{FW: 1664.66; white pwdr.;} \ SA: 1180-1240\text{mg}g^{-1} \text{P.Vol: 0.45-0.48} \\
\text{Note: Particle size: 0.2-0.5 micron, Thermal stability: 400°C, Activation temperature: 300°C} \\
\text{Sold under license from Inven2 AS for research purposes only. EP 09738396 and US 12/989,64} \\
\text{J. Phys.Chem. C., 2012, 116, 13264.}
\]
40-1114  Zirconium Fumarate MOF (UIO-66-FA, FA:Zr=0.66-0.98)
Zr$_2$O$_4$(OH)$_2$(C$_2$H$_4$O$_4$)$_x$, \( x = 3.96\)–5.88; white solid; SA: 650–960; P.Vol. 0.26–0.4
Note: Particle size: 0.1–0.5 micron, Thermal stability: 200°C, Activation temperature: 130°C
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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:

40-1106  Zirconium trans-1,2-ethylenedicarboxylic acid MOF (UIO-66-FA, FA:Zr=1)
Zr$_2$O$_4$(OH)$_2$(C$_2$H$_4$O$_4$)$_x$, \( x = 0.1-0.5 \) micron; Thermal stability: 200°C, Activation temperature: 150°C
Note: Particle size: 0.1–0.5 micron; Thermal stability: 200°C; Activation temperature: 150°C
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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:

40-1111  Zirconium trimellitate MOF (UIO-66-BDC-COOH, BDC-COOH:Zr=0.9-1.0)
Zr$_2$(OH)$_2$(C$_6$H$_4$O$_4$)$_x$, \( x = 5.4-6.0 \); white solid; SA: 550–600; P.Vol. 0.25–0.27
Note: Particle size: 0.2-0.5 micron; Thermal stability: 350°C; Activation temperature: 150°C
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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: