# Ковалентные органические каркасы

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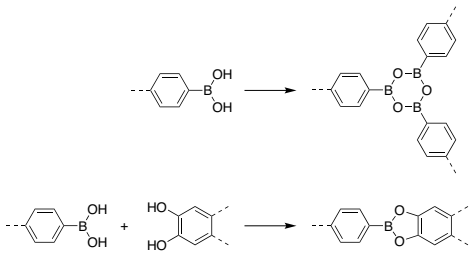
# Covalent Organic Framework (COF) Linkers

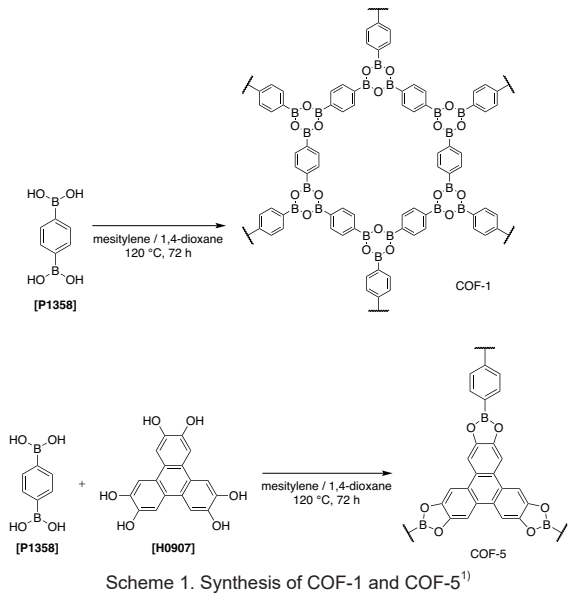
Covalent organic frameworks (COFs) are crystalline organic frameworks consisting of a network structure made of covalent bonds.[1,2] COFs are classified as porous crystalline materials similar to metal-organic frameworks (MOFs)/porous coordination polymers (PCPs) and zeolites. They include 2D COFs, which are constructed by stacking layers of 2D covalently bonded sheets, and 3D COFs, which are constructed by 3D connected frameworks. COFs are expected to be used as molecular storage or separation materials, catalysts, electronic materials, energy storage materials, battery materials, and drug delivery materials, due to their porosity, crystallinity, and structural diversity.

COFs are designed and synthesized by combining monomers, also known as linkers, according to intended topology. Some synthetic examples are shown below with synthetic strategies.

## ● Boroxines and boronic esters

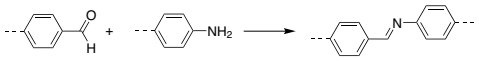


The self-condensation of boronic acids to produce boroxines and the condensation of boronic acids and catechols to produce boronic esters are the first synthetic strategies to synthesize COFs (Scheme 1).[1] The advantages of boroxine-based COFs and boronic ester-based COFs include their tendency to have good crystallinity, large surface area, and high thermal stability.

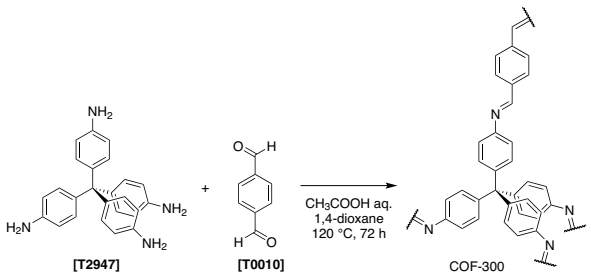



Scheme 1. Synthesis of COF-1 and COF-5[1]

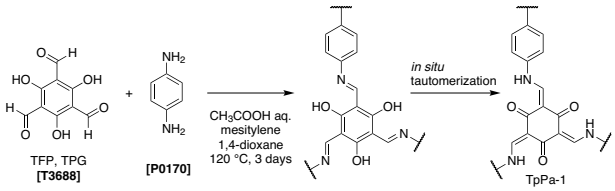
## ● Imines



Imine-linked covalent organic framework, synthesized by condensation of aldehydes and amines, was first reported in 2009 (Scheme 2),[4] and imine-based COFs are now the most widely reported COFs. Imine-based COFs have higher chemical stability compared to boroxines and boronic esters. In addition, several researchers have reported post-synthetic modification or functionalization of imine-based COFs, such as the synthesis of COFs for $CO_2$ capture through the post-synthetic modification and functionalization of imine-based structures.[5] In 2012, it was reported that β-ketoenamine-type COFs can be synthesized by using 2,4,6-triformylphloroglucinol (TPG, TFP) as an aldehyde linker (Scheme 3).[6] These compounds have recently received a lot of attention due to their stability towards acids and bases.

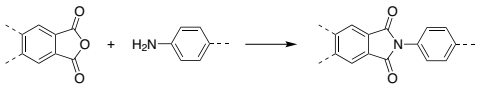



Scheme 2. Synthesis of COF-300[4]




Scheme 3. Synthesis of TpPa-1[6]

## ● Imides



Imide-linked COFs obtained by condensation of carboxylic anhydrides and amines have also been reported[7] and are expected to be applied to battery materials[8] and $CO_2$ capture materials.[9]

## ● Other synthetic strategies

COFs constructed by other linkers besides imines, imides, and boroxines have been realized. Linkers other than amines, aldehydes, carboxylic anhydrides, and boronic acids are used as linkers to prepare these COFs. For example, hydrazone-type

COFs synthesized using hydrazines and aldehydes[10,11] and ionic COFs synthesized using 1,2,3-triaminoguanidinium chloride[12] were reported.

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# Amine Linkers

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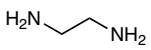
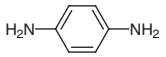


Ethylenediamine
Anhydrous
CAS RN: 107-15-3

**P0170** 5g 25g 250g



1,4-Phenylenediamine
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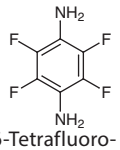
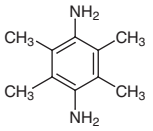
**T1110** 1g



2,3,5,6-Tetrafluoro-
1,4-phenylenediamine
CAS RN: 1198-64-7

**T1457** 5g 25g



TMPD
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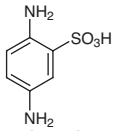
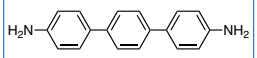
**P1691** 5g 25g



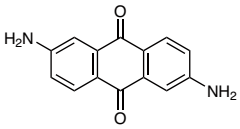
1,4-Phenylenediamine-
2-sulfonic Acid
CAS RN: 88-45-9

**D3390** 1g 5g



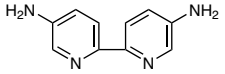
4,4''-Diamino-*p*-terphenyl
CAS RN: 3365-85-3

**D3180** 25g



2,6-Diaminoanthraquinone
CAS RN: 131-14-6

**D2893** 1g 5g



[2,2′-Bipyridine]-
5,5′-diamine
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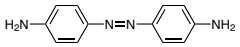
**D3430** 1g 5g



4,4′-Azodianiline
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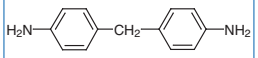
**M0220** 25g 500g



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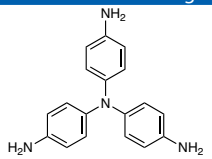
**T2332** 1g 5g



TAPA
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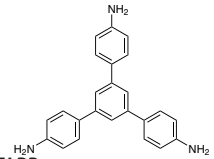
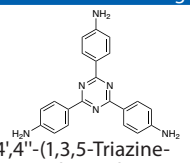
**T2728** 5g 25g



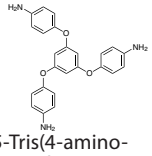
TAPB
CAS RN: 118727-34-7

**T3695** 1g 5g



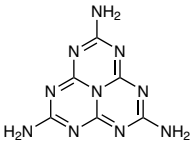
4,4',4''-(1,3,5-Triazine-
2,4,6-triyl)trianiline
CAS RN: 14544-47-9

**T3909** 200mg 1g



1,3,5-Tris(4-amino-
phenoxy)benzene
CAS RN: 102852-92-6

**M3538** 1g



Melem
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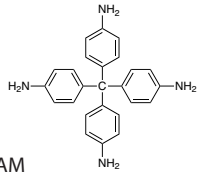
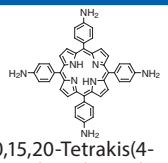
**T2947** 200mg 1g



TAM
CAS RN: 60532-63-0

**T1494** 100mg



5,10,15,20-Tetrakis(4-
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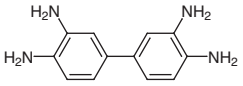
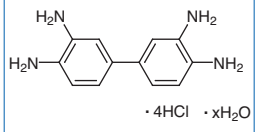
**D0077** 5g 25g



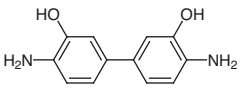
3,3'-Diaminobenzidine
CAS RN: 91-95-2

**D0078** 5g 25g



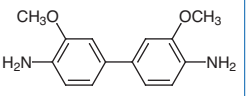
DAB·4HCl Hydrate
CAS RN: 868272-85-9

**D2312** 5g 25g



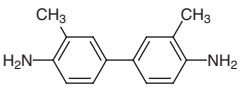
3,3'-Dihydroxybenzidine
CAS RN: 2373-98-0

**D1344** 25g 100g



*o*-Dianisidine
CAS RN: 119-90-4

**T0253** 1g 5g



*o*-Tolidine
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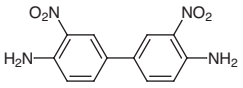
**D0822** 25g



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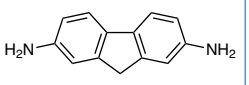
**D0092** 250mg 1g 5g 25g



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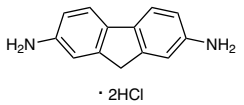
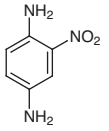
**D0093** 5g 25g



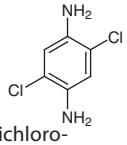
2,7-Diaminofluorene
Dihydrochloride
CAS RN: 13548-69-1

**D0105** 25g 500g



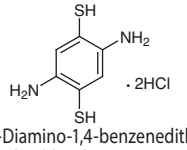
2-Nitro-
1,4-phenylenediamine
CAS RN: 5307-14-2

**D1873** 25g 250g



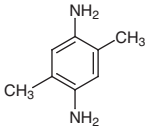
2,5-Dichloro-
1,4-phenylenediamine
CAS RN: 20103-09-7

**D2022** 5g 25g



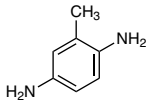
2,5-Diamino-1,4-benzenedithiol
Dihydrochloride
CAS RN: 75464-52-7

**D2183** 25g 100g



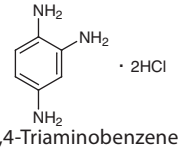
2,5-Diamino-*p*-xylene
CAS RN: 6393-01-7

**D4628** 5g 25g



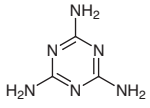
2,5-Diaminotoluene
CAS RN: 95-70-5

**T0334** 1g



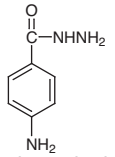
1,2,4-Triaminobenzene
Dihydrochloride
CAS RN: 615-47-4

**T0337** 5g 25g 500g



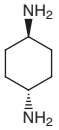
Melamine Monomer
CAS RN: 108-78-1

**A1211** 25g



4-Aminobenzohydrazide
CAS RN: 5351-17-7

**C1426** 5g 25g 100g



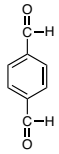
*trans*-1,4-
Cyclohexanediamine
CAS RN: 2615-25-0



Please inquire for pricing and availability of listed products to our local sales representatives.

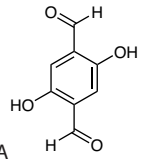
# Aldehyde Linkers

**T0010** 25g 100g 500g



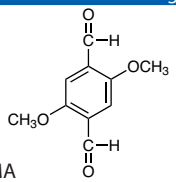
Terephthalaldehyde
CAS RN: 623-27-8

**D5510** 1g 5g



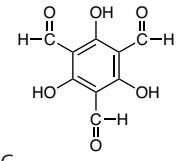
DHTA
CAS RN: 1951-36-6

**D6056** 1g 5g



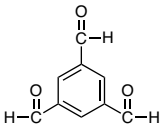
DMA
CAS RN: 7310-97-6

**T3688** 200mg 1g



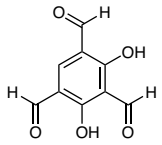
TPG
CAS RN: 34374-88-4

**B6003** 200mg 1g



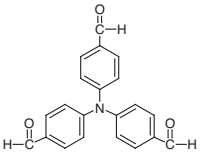
BTA
CAS RN: 3163-76-6

**D6046** 1g 5g



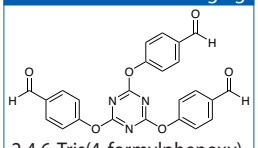
2,4,6-Triformylresorcinol
CAS RN: 58343-11-6

**T2310** 500mg



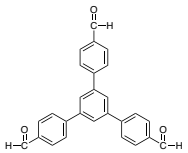
Tris(4-formylphenyl)amine
CAS RN: 119001-43-3

**T4077** 1g 5g



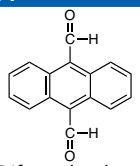
2,4,6-Tris(4-formylphenoxy)-
1,3,5-triazine
CAS RN: 3140-75-8

**F1252** 200mg 1g



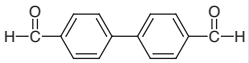
TFPB
CAS RN: 118688-53-2

**A2664** 1g 5g



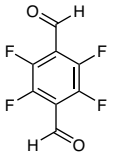
9,10-Diformylanthracene
CAS RN: 7044-91-9

**B2854** 1g 5g



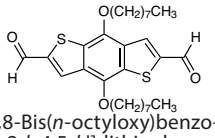
BPDA
CAS RN: 66-98-8

**T4088** 1g 5g



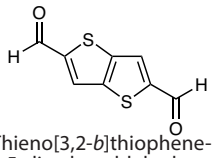
TFTA
CAS RN: 3217-47-8

**B5484** 200mg



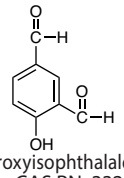
4,8-Bis(*n*-octyloxy)benzo-
[1,2-*b*:4,5-*b*']dithiophene-
2,6-dicarbaldehyde
CAS RN: 1668554-22-0

**T3212** 200mg 1g



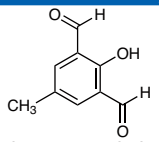
Thieno[3,2-*b*]thiophene-
2,5-dicarboxaldehyde
CAS RN: 37882-75-0

**F0310** 1g 5g 25g



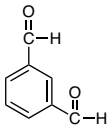
4-Hydroxyisophthalaldehyde
CAS RN: 3328-70-9

**H0683** 1g 5g



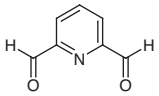
2-Hydroxy-5-methyl-
isophthalaldehyde
CAS RN: 7310-95-4

**I0153** 25g 100g 250g



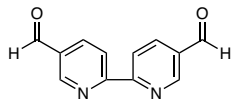
Isophthalaldehyde
CAS RN: 626-19-7

**P0949** 1g 5g



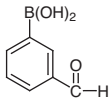
2,6-Pyridinedicarboxaldehyde
CAS RN: 5431-44-7

**B6576** 1g



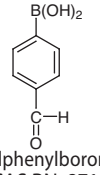
[2,2′-Bipyridine]-
5,5′-dicarbaldehyde
CAS RN: 135822-72-9

**F0445** 1g 5g 25g



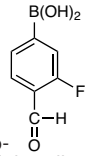
3-Formylphenylboronic Acid
CAS RN: 87199-16-4

**F0446** 1g 5g



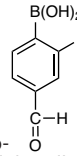
4-Formylphenylboronic Acid
CAS RN: 87199-17-5

**F1051** 1g 5g



3-Fluoro-
4-formylphenylboronic Acid
CAS RN: 248270-25-9

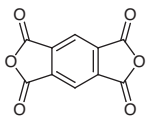
**F1079** 1g



2-Fluoro-
4-formylphenylboronic Acid
CAS RN: 871126-22-6

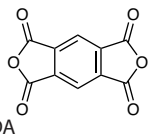
# Carboxylic Anhydride Linkers

**B0040** 25g 100g 500g



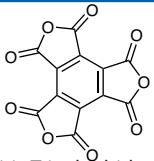
PMDA
CAS RN: 89-32-7

**P2103** 5g 25g



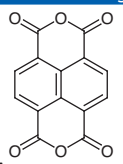
PMDA
(purified by sublimation)
CAS RN: 89-32-7

**M3617** 1g 5g



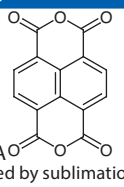
Mellitic Trianhydride
CAS RN: 4253-24-1

**N0369** 25g 250g



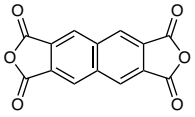
NTCDA
CAS RN: 81-30-1

**N0755** 1g 5g



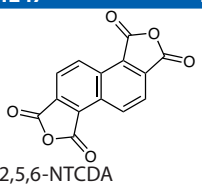
NTCDA
(purified by sublimation)
CAS RN: 81-30-1

**N1128** 1g 5g



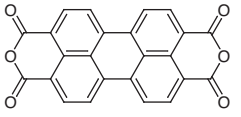
2,3,6,7-NTCDA
CAS RN: 3711-01-1

**N1247** 1g



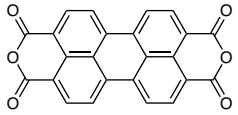
1,2,5,6-NTCDA
CAS RN: 3711-03-3

**P0972** 25g 100g 500g



PTCDA
CAS RN: 128-69-8

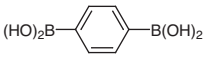
**P2102** 1g



PTCDA
(purified by sublimation)
CAS RN: 128-69-8

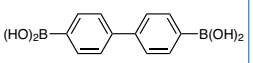
# Boronic Acid Linkers

**P1358** 1g 5g 25g



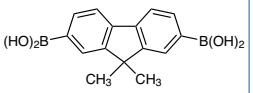
BDBA
CAS RN: 4612-26-4

**B2490** 1g 5g



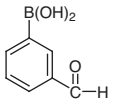
BPDA
CAS RN: 4151-80-8

**D4701** 1g



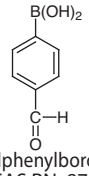
(9,9-Dimethyl-9*H*-fluorene-2,7-diyl)diboronic Acid
CAS RN: 866100-14-3

**F0445** 1g 5g 25g



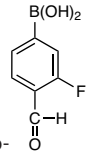
3-Formylphenylboronic Acid
CAS RN: 87199-16-4

**F0446** 1g 5g



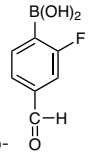
4-Formylphenylboronic Acid
CAS RN: 87199-17-5

**F1051** 1g 5g



3-Fluoro-
4-formylphenylboronic Acid
CAS RN: 248270-25-9

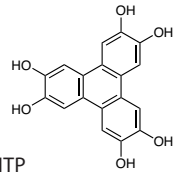
**F1079** 1g



2-Fluoro-
4-formylphenylboronic Acid
CAS RN: 871126-22-6

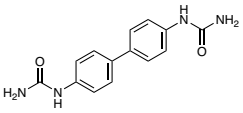
# Other Linkers

**H0907** 1g 5g



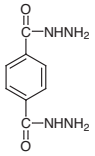
HHTP
CAS RN: 4877-80-9

**B6577** 1g 5g



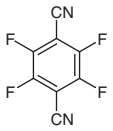
1,1′-([1,1′-Biphenyl]-
4,4′-diyl)diurea
CAS RN: 13140-82-4

**T0758** 25g 500g



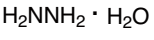
Terephthalic Dihydrazide
CAS RN: 136-64-1

**T1050** 1g 5g 25g



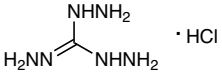
Tetrafluoroterephthalonitrile
CAS RN: 1835-49-0

**H0172** 25mL 500mL



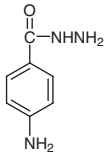
Hydrazine Monohydrate
CAS RN: 7803-57-8

**T4080** 1g 5g



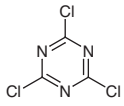
*N*,*N*',*N*''-Triaminoguanidine
Hydrochloride
CAS RN: 5329-29-3

**A1211** 25g



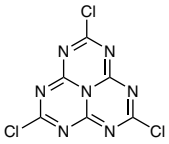
4-Aminobenzohydrazide
CAS RN: 5351-17-7

**C0460** 25g 500g



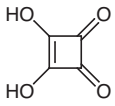
Cyanuric Chloride
CAS RN: 108-77-0

**T4145** 1g



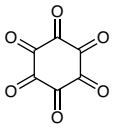
Heptazine Chloride
CAS RN: 6710-92-5

**D1399** 5g 25g



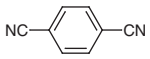
Squaric Acid
CAS RN: 2892-51-5

**T0876** 1g 5g



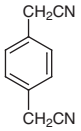
Triquinoyl
CAS RN: 527-31-1

**T0016** 25g 100g 500g



Terephthalonitrile
CAS RN: 623-26-7

**X0061** 5g 25g



1,4-Phenylenediacetonitrile
CAS RN: 622-75-3



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