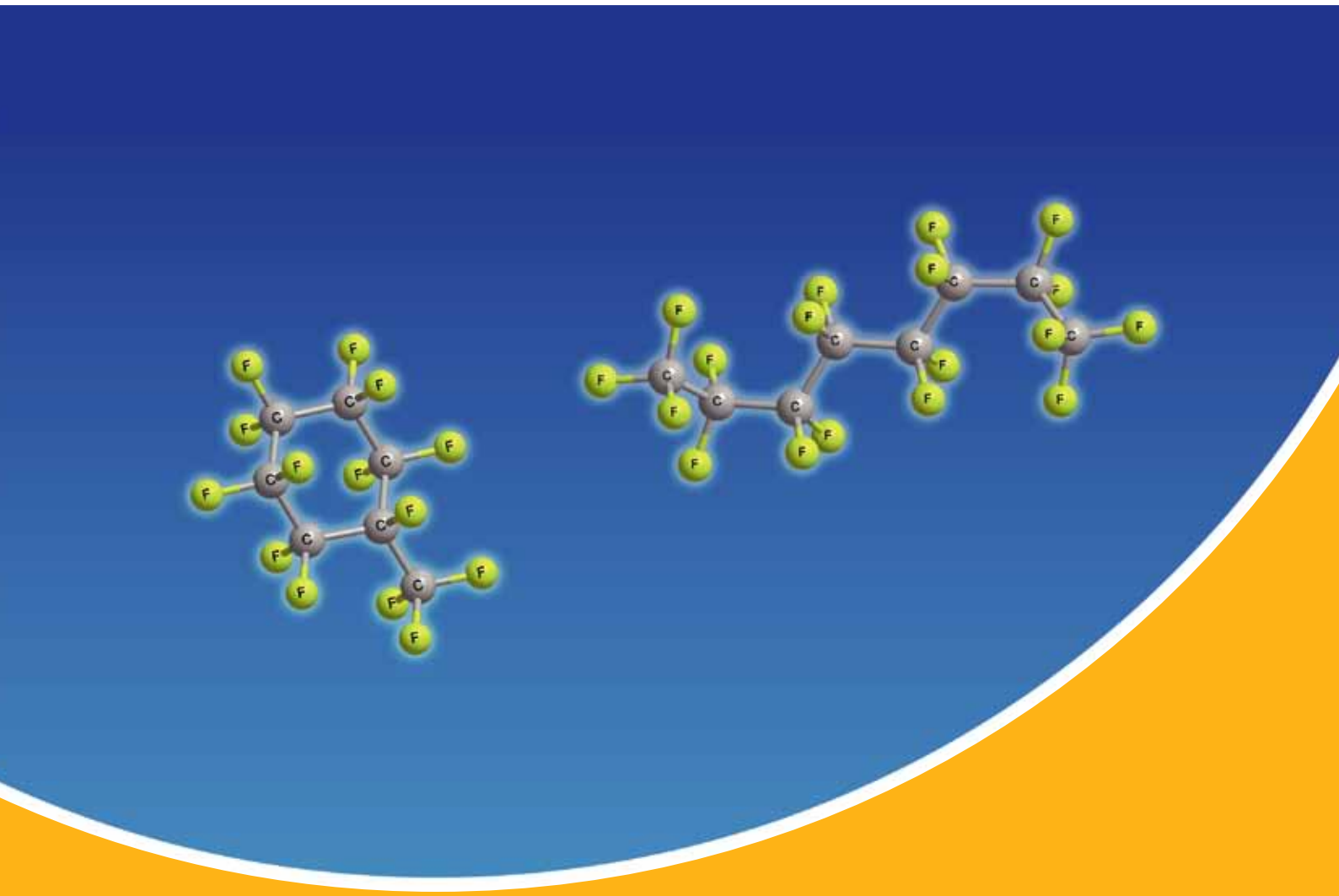
CHEMISTRY

氟化学

Fluorous Chemistry



含氟溶剂

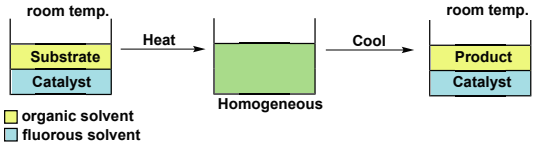
含氟化合物

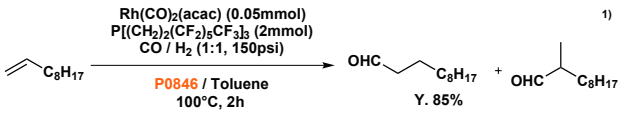
氟化学

近来，从“绿色化学”的角度出发，对氟化学的研究越来越深入，因为其产物易于分离，并且溶剂也可重复利用。含氟的英文“fluorous”与“aqueous”（水溶液的）相近，意为可溶解在氟碳溶剂中。尽管高度氟化的化合物（含氟化合物）既不溶于普通有机溶剂，也不溶于水，但可以很好的溶解在全氟烷烃等含氟溶剂中。氟化学正是利用了含氟化合物的这种特性，相关应用十分广泛。

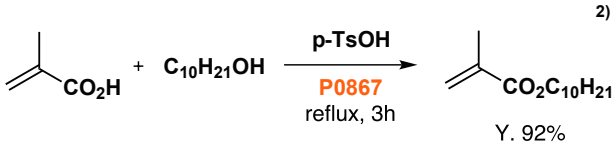
1. 利用含氟溶剂进行有机反应

尽管含氟溶剂与水和普通有机溶剂都不混溶，但特定的含氟溶剂可以在高温下与一些有机溶剂形成均相溶液。另外，不管分子量大小，这些含氟溶剂的沸点与相应的碳氢化合物相差无几，并且对很多气体都有较高的溶解性。1994年，Horváth等人利用这些优点，在全氟甲基环己烷和甲苯中，使用氟代铑催化剂完成了烯烃的加氢甲酰化[1]。这被认为是氟化学的起源。该反应利用全氟甲基环己烷 [P0846]和甲苯作为溶剂，在室温下形成两相体系。含氟催化剂存在于氟相中，烯烃存在于有机相中。加热时，两相体系转变为均相溶液。之后，加入一氧化碳和氢气进行反应。反应结束并且反应液冷却后，重新形成两相体系，其中，产物溶于甲苯相，含氟催化剂溶于氟相，易于实现催化剂和产物的分离。这种利用一种含氟溶剂和一种有机溶剂形成的两相体系被称为氟两相体系(FBS)，多相体系则被称为氟多相体系(FMS)。FBS和FMS的优点在于，产物和催化剂易于分离，反应结束后通过将氟相和其它相简单地分离即可实现。并且，含有催化剂的氟相被分离后可以被重复使用。

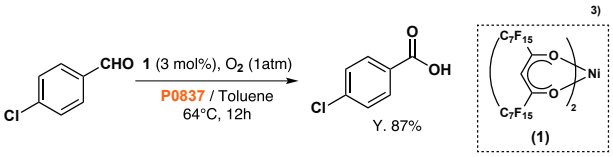




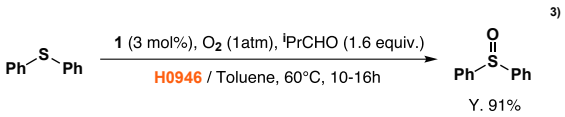
Zhu也报道了在全氟(2-丁基四氢呋喃)[P0867]溶剂中，对甲苯磺酸催化甲基丙烯酸和癸醇合成羧酸酯的反应[2]。该反应中，甲基丙烯酸、癸醇和酸催化剂在加热条件下溶于含氟溶剂中，而反应中生成的水并不与含氟溶剂相溶。当反应混合物冷却后，得到的产物羧酸酯浮在水相上方，从而可以被分离出来。

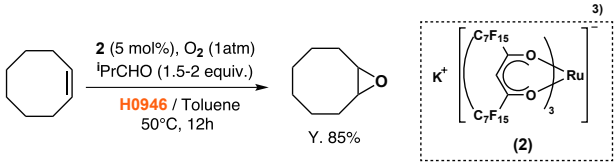


在含氟溶剂和有机溶剂组成的两相体系中，氧气参与的氧化反应也有大量研究。Knochel等报道了在镍与含氟β-二酮配体络合物的催化作用下，醛、烯烃以及硫化物的氧化反应[3]。对于醛的氧化，十八氟十氢萘[P0837]和甲苯用作溶剂，在加热条件下，该反应体系会形成均相溶液。当反应结束并且冷却至室温后，催化剂留在氟相中，而产物在有机相中，易于分离。含氟溶剂溶解性强，因此适合很多有气体试剂参与的反应。

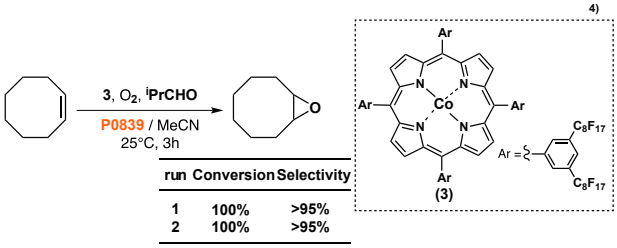


硫化物和烯烃在异丁醛存在的条件下进行氧化反应也有诸多类似的研究[3]。这些反应中用到的溶剂为全氟溴辛烷[H0946]和甲苯，在加热时也会形成均相溶液。



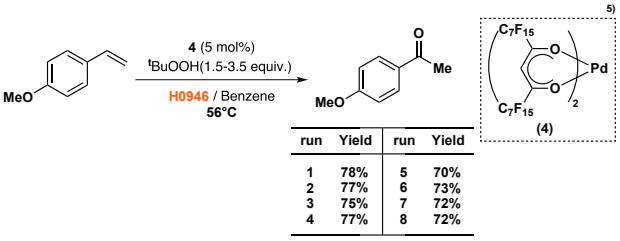


Pozzi等也报道了在异丁醛存在的条件下，氟代卟啉-钴络合物催化氧气参与的烯烃的环氧化反应[4]。该反应在全氟正己烷[P0839]和乙腈组成的两相体系中进行，室温下搅拌即可。反应完成后，催化剂和产物照常分离，含有催化剂的氟相被重复利用。



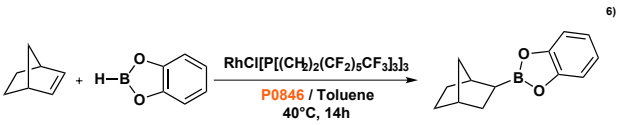
run	Conversion	Selectivity
1	100%	>95%
2	100%	>95%

利用全氟溴辛烷作为含氟溶剂的Wacker氧化反应也被报道过[5]。加热条件下，全氟溴辛烷[H0946]和苯形成均相溶液。反应结束并冷却后，产物从钯和氟代β-二酮的络合物催化剂中分离出。之后，氟相被重复利用。



run	Yield	run	Yield
1	78%	5	70%
2	77%	6	73%
3	75%	7	72%
4	77%	8	72%

Horváth和Gladysz等则报道了在全氟甲基环己烷[P0846]和甲苯中进行的硼氢化反应，该反应使用铑和含氟配体组成的络合物作为催化剂[6]。反应完成后，产物被分离出，含有催化剂的氟相则继续被重复使用。



run	Yield	TON
1	90%	854
2	83%	785
3	81%	770

2. 应用于糖链合成及组合化学

Curran等将含氟取代基（氟标记）引入到不含氟的底物中，并利用这种含氟化合物合成异恶唑啉[7]。反应结束后，含氟产物可以用二氯甲烷，水及全氟己烷萃取。自此报道之后，氟化学被广泛应用于组合化学中[8]。Inazu等还将此种的化学反应用于低聚糖的合成[9]。该反应中，氟标记先被引入到糖分子中，随后发生糖基化。利用有机溶剂，水及全氟己烷可以将得到的低聚糖萃取出来。

如上所述，Horváth等引入的氟化学被广泛应用于合成化学的各个领域。这类化学，使产物易于从催化剂和含氟溶剂中分离出。并且，分离后的含氟溶剂和催化剂可以被重复利用。围绕其在绿色化学方面的应用，大量研究被展开。氟化学也有望在组合化学中得到广泛应用，从而实现在多阶段多种化合物的同时处理。

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K. Ishihara, H. Yamamoto, *Kagaku To Kogyo*, **2001**, *54*, 1061; K. Ishihara, *Kagaku To Kogyo*, **2002**, *55*, 865; I. Ryu, H. Matsubara, *Kagaku*, **2002**, *57(5)*, 20; S. Takeuchi, Y. Nakamura, *Kagaku*, **2002**, *57(6)*, 16; K. Mikami, H. Matsuzawa, *Kagaku*, **2002**, *57(7)*, 22; K. Ishihara, H. Yamamoto, *Kagaku*, **2002**, *57(8)*, 30.

关键词 : *fluorous chemistry, fluorous solvents, environmentally-friendly solvents*

含氟溶剂
Fluorous Solvents

P0839 25g 250g
$CF_3(CF_2)_4CF_3$
Perfluorohexane
CAS RN: 355-42-0

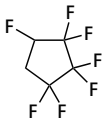
P0851 10g
$CF_3(CF_2)_5CF_3$
Perfluoroheptane
(mixture of isomers)
CAS RN: 335-57-9

O0268 10g
$CF_3(CF_2)_6CF_3$
Perfluorooctane
CAS RN: 307-34-6

E0485 5g 25g
$CF_3(CF_2)_7CF_3$
Perfluorononane
CAS RN: 375-96-2

P1755 1g
$CF_3(CF_2)_{10}CF_3$
Perfluorododecane
CAS RN: 307-59-5

T1012 25mL
$CF_3CF_2CF_2CF(CF_3)_2$
Perfluoroisohexane
CAS RN: 355-04-4

H1013 25g 500g

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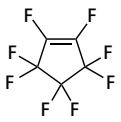
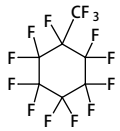
CAS RN: 15290-77-4

O0292 10g 50g

Perfluorocyclopentene
CAS RN: 559-40-0

P0846 25g 100g

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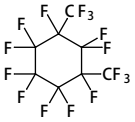
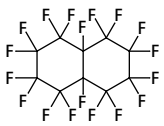
CAS RN: 355-02-2

P1420 25g

Perfluoro(1,3-dimethyl-cyclohexane)
CAS RN: 335-27-3

P0837 25g

Perfluorodecalin
CAS RN: 306-94-5

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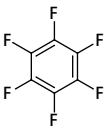
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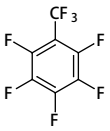
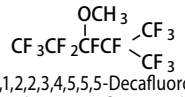
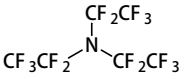
CAS RN: 392-56-3

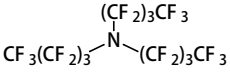
P0856 5g 25g

Perfluorotoluene
CAS RN: 434-64-0

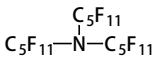
H0946 5g 25g
$CF_3(CF_2)_7Br$
Perfluoro-*n*-octyl Bromide
CAS RN: 423-55-2

D4484 25g 500g

1,1,1,2,2,3,4,5,5,5-Decafluoro-3-methoxy-4-(trifluoromethyl)-pentane
CAS RN: 132182-92-4

P0867 25g
Perfluoro-(2-butyltetrahydrofuran)
CAS RN: 335-36-4

P1348 5g 25g

Perfluorotriethylamine
CAS RN: 359-70-6

P0074 25g 100g

Perfluorotributylamine
CAS RN: 311-89-7

P1051 25g

Perfluorotriamylamine
CAS RN: 338-84-1

含氟化合物
Fluorous Compounds

氟代炔烃，氟代烯烃
Fluorous Alkanes, Fluorous Alkenes

H0846 5g 25g
$CF_3(CF_2)_7CH{=}CH_2$
(Perfluoro-*n*-octyl)ethylene
CAS RN: 21652-58-4

N0601 5g 25g
$CF_3(CF_2)_3CH{=}CH_2$
(Perfluorobutyl)ethylene
CAS RN: 19430-93-4

P1102 5g 25g 100g
$CF_3(CF_2)_5CH{=}CH_2$
(Perfluorohexyl)ethylene
CAS RN: 25291-17-2

T2496 5g
$CF_3(CF_2)_4CHF_2$
1*H*-Tridecafluorohexane
CAS RN: 355-37-3

U0076 5g
$CF_3(CF_2)_3CHF_2$
1*H*-Undecafluoropentane
CAS RN: 375-61-1

氟代醇
Fluorous Alcohols

D4128 5g 25g
CHF_2CH_2OH
2,2-Difluoroethanol
CAS RN: 359-13-7

D1101 25g 100g
$H(CF_2)_6CH_2OH$
1,1,7-Trihydroperfluoroheptanol
CAS RN: 335-99-9

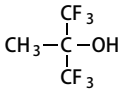
D2891 5g
$HOCH_2(CF_2)_6CH_2OH$
2,2,3,3,4,4,5,5,6,6,7,7-Dodecafluoro-1,8-octanediol
CAS RN: 90177-96-1

E0239 10g
$H(CF_2)_{10}CH_2OH$
1*H*,1*H*,11*H*-Eicosafluoro-1-undecanol
CAS RN: 307-70-0

H0845 25g 250g
$CF_3(CF_2)_7CH_2CH_2OH$
2-(Perfluoro-*n*-octyl)ethanol
CAS RN: 678-39-7

H1232 5g
$CF_3(CF_2)_7CH_2OH$
1*H*,1*H*-Perfluoro-1-nonanol
CAS RN: 423-56-3

H1349 5g 25g



1,1,1,3,3,3-Hexafluoro-2-methyl-2-propanol
CAS RN: 1515-14-6

H0548 5g 25g

$CF_3CF_2CF_2CH_2OH$

1*H*,1*H*-Heptafluoro-1-butanol
CAS RN: 375-01-9

H1233 1g 5g

$HOCH_2(CF_2)_8CH_2OH$

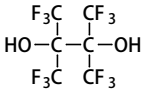
1*H*,1*H*,10*H*,10*H*-Hexadecafluoro-1,10-decanediol
CAS RN: 754-96-1

H1035 25g

$H(CF_2)_8CH_2OH$

1*H*,1*H*,9*H*-Hexadecafluoro-1-nonanol
CAS RN: 376-18-1

H1279 5g 25g



Perfluoropinacol
CAS RN: 918-21-8

H0649 25g

$CF_3CHFCF_2CH_2OH$

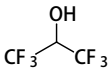
2,2,3,4,4,4-Hexafluoro-1-butanol
CAS RN: 382-31-0

H0746 1g 5g 25g

$HOCH_2(CF_2)_3CH_2OH$

2,2,3,3,4,4-Hexafluoro-1,5-pentanediol
CAS RN: 376-90-9

H0424 25g 100g 500g



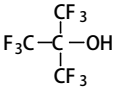
1,1,1,3,3,3-Hexafluoro-2-propanol
CAS RN: 920-66-1

N0814 5g

$CF_3(CF_2)_8CH_2OH$

1*H*,1*H*-Perfluoro-1-decanol
CAS RN: 307-37-9

N0692 1g 5g 25g



Perfluoro-*tert*-butanol
CAS RN: 2378-02-1

N0600 5g 25g

$CF_3(CF_2)_3CH_2CH_2OH$

2-(Perfluorobutyl)ethanol
CAS RN: 2043-47-2

N0810 1g 5g 25g

$CF_3(CF_2)_3CH_2OH$

(Perfluorobutyl)methanol
CAS RN: 355-28-2

O0294 5g 25g

$HOCH_2(CF_2)_4CH_2OH$

2,2,3,3,4,4,5,5-Octafluoro-1,6-hexanediol
CAS RN: 355-74-8

O0114 25g 100g 500g

$CHF_2(CF_2)_3CH_2OH$

2,2,3,3,4,4,5,5-Octafluoro-1-pentanol
CAS RN: 355-80-6

P0904 5g 25g

$CF_3(CF_2)_6CH_2OH$

1*H*,1*H*-Perfluoro-1-octanol
CAS RN: 307-30-2

P0845 25g

$CF_3CF_2CH_2OH$

1*H*,1*H*-Pentafluoro-1-propanol
CAS RN: 422-05-9

T1701 5g 25g

$CF_3(CF_2)_5CH_2OH$

1*H*,1*H*-Perfluoro-1-heptanol
CAS RN: 375-82-6

T2528 5g 25g

$CF_3(CF_2)_5CH_2CH_2OH$

2-(Perfluorohexyl)ethanol
CAS RN: 647-42-7

T0435 25g 100g 500g

CF_3CH_2OH

2,2,2-Trifluoroethanol
CAS RN: 75-89-8

T3381 1g 5g

$CF_3(CF_2)_{10}CH_2OH$

1*H*,1*H*-Tricosafluoro-1-dodecanol
CAS RN: 423-65-4

T0101 25g 100g 500g

$CHF_2CF_2CH_2OH$

2,2,3,3-Tetrafluoro-1-propanol
CAS RN: 76-37-9

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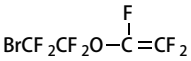
Fluorous Ethers

B1293 1g 5g

$CF_3CH_2OCH_2CF_3$

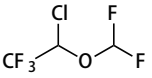
2,2,2-Trifluoroethyl Ether
CAS RN: 333-36-8

B4169 5g



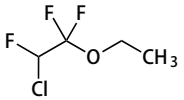
2-Bromotetrafluoroethyl Trifluorovinyl Ether
CAS RN: 85737-06-0

C2485 5g 25g



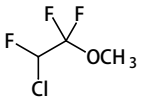
Isoflurane
CAS RN: 26675-46-7

C2862 5g



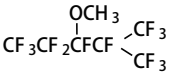
2-Chloro-1,1,2-trifluoroethyl Ethyl Ether
CAS RN: 310-71-4

C0853 5g



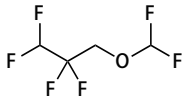
2-Chloro-1,1,2-trifluoroethyl Methyl Ether
CAS RN: 425-87-6

D4484 25g 500g



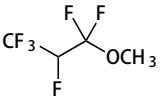
1,1,1,2,2,3,4,5,5,5-Decafluoro-3-methoxy-4-(trifluoromethyl)pentane
CAS RN: 132182-92-4

D4472 1g 5g



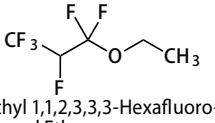
Difluoromethyl 2,2,3,3-Tetrafluoropropyl Ether
CAS RN: 35042-99-0

H1507 5g 25g



1,1,2,3,3,3-Hexafluoropropyl Methyl Ether
CAS RN: 382-34-3

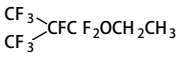
E1020 5g 25g



Ethyl 1,1,2,3,3,3-Hexafluoropropyl Ether
CAS RN: 380-34-7

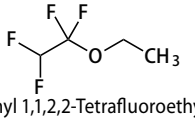
E0528 25g 500g

$CF_3(CF_2)_3OCH_2CH_3$



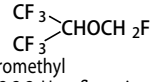
(mixture of isomers)
Ethyl Nonafluorobutyl Ether (mixture of isomers)
CAS RN: 813458-04-7

E1019 5g 25g



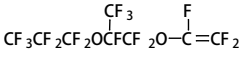
Ethyl 1,1,2,2-Tetrafluoroethyl Ether
CAS RN: 512-51-6

F0691 5g



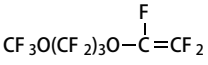
Fluoromethyl 1,1,1,3,3,3-Hexafluoroisopropyl Ether
CAS RN: 28523-86-6

P1226 5g



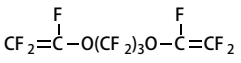
2-(Heptafluoropropoxy)-hexafluoropropyl Trifluorovinyl Ether
CAS RN: 1644-11-7

H1610 5g 25g



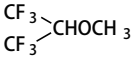
1,1,2,2,3,3-Hexafluoro-1-(trifluoromethoxy)-3-[(1,2,2-trifluorovinyl)oxy]propane
CAS RN: 40573-09-9

H1611 5g



1,1,2,2,3,3-Hexafluoro-1,3-bis[(1,2,2-trifluorovinyl)oxy]-propane
CAS RN: 13846-22-5

H1524 5g 25g



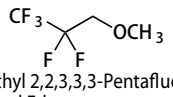
Isoindoklon
CAS RN: 13171-18-1

M1345 25g 500g

$CF_3(CF_2)_3OCH_3$

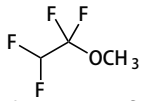
(mixture of isomers)
Methyl Nonafluorobutyl Ether
CAS RN: 219484-64-7

M2500 1g



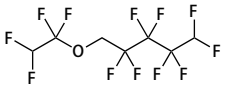
Methyl 2,2,3,3,3-Pentafluoropropyl Ether
CAS RN: 378-16-5

M2514 25g



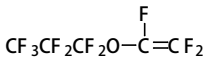
Methyl 1,1,2,2-Tetrafluoroethyl Ether
CAS RN: 425-88-7

O0422 5g 25g



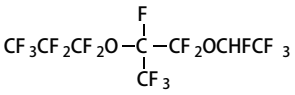
1*H*,1*H*,5*H*-Octafluoropentyl 1,1,2,2-Tetrafluoroethyl Ether
CAS RN: 16627-71-7

P1224 10g



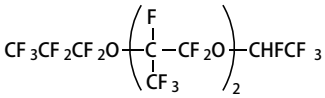
Perfluoropropoxyethylene
CAS RN: 1623-05-8

H1624 25g



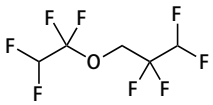
1,1,1,2,2,3,3-Heptafluoro-3-[[1,1,1,2,3,3-hexafluoro-3-(1,2,2,2-tetrafluoroethoxy)propan-2-yl]oxy]propane
CAS RN: 3330-14-1

H1625 25g



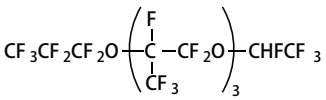
1,1,1,2,2,3,3-Heptafluoro-3-[[1,1,1,2,3,3-hexafluoro-3-[[1,1,1,2,3,3-hexafluoro-3-(1,2,2,2-tetrafluoroethoxy)-propan-2-yl]oxy]propan-2-yl]oxy]propane
CAS RN: 3330-16-3

T3069 5g 25g



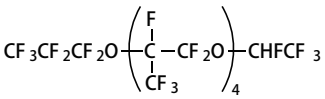
1,1,2,2-Tetrafluoroethyl 2,2,3,3-Tetrafluoropropyl Ether
CAS RN: 16627-68-2

I1044 25g



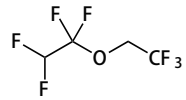
1,1,1,2,4,4,5,7,7,8,10,10,11,13,13,14,14,15,15,15-Icosafluoro-5,8,11-tris(trifluoromethyl)-3,6,9,12-tetraoxapentadecane
CAS RN: 26738-51-2

T3538 25g



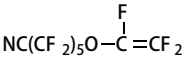
1,1,1,2,4,4,5,7,7,8,10,10,11,13,13,14,16,16,17,17,18,18,18-Tricosafluoro-5,8,11,14-tetrakis(trifluoromethyl)-3,6,9,12,15-pentaoxaoctadecane
CAS RN: 37486-69-4

T3057 5g 25g



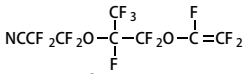
1,1,2,2-Tetrafluoroethyl 2,2,2-Trifluoroethyl Ether
CAS RN: 406-78-0

D5223 5g 25g



2,2,3,3,4,4,5,5,6,6-Decafluoro-6-[(1,2,2-trifluorovinyl)oxy]-hexanenitrile
CAS RN: 120903-40-4

T3493 5g 25g



2,2,3,3-Tetrafluoro-3-[[1,1,1,2,3,3-hexafluoro-3-[(1,2,2-trifluorovinyl)-oxy]propan-2-yl]oxy]propionitrile
CAS RN: 69804-19-9

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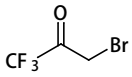
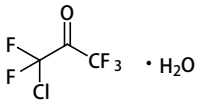
Fluorous Ketones

B1240 5g 25g



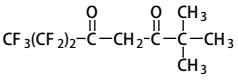
1-Bromo-3,3,3-trifluoroacetone
CAS RN: 431-35-6

C0993 1g



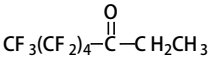
Chloropentafluoroacetone Monohydrate
CAS RN: 6984-99-2

D1729 5g



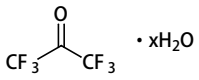
2,2-Dimethyl-6,6,7,7,8,8,8-heptafluoro-3,5-octanedione
CAS RN: 17587-22-3

P1363 5g



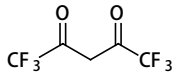
Ethyl Undecafluoroamyl Ketone
CAS RN: 383177-55-7

H0425 5g 25g



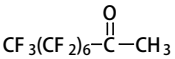
Hexafluoroacetone Hydrate
CAS RN: 34202-69-2

H0476 5g 25g



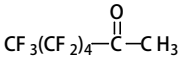
Hexafluoroacetylacetone
CAS RN: 1522-22-1

P1452 5g



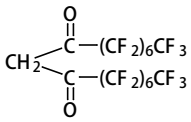
Methyl Pentadecafluoroheptyl Ketone
CAS RN: 754-85-8

U0071 5g



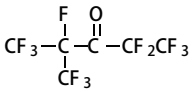
Methyl Undecafluoroamyl Ketone
CAS RN: 2708-07-8

T2037 100mg



9*H*,9*H*-Triacontafluoro-8,10-heptadecanedione
CAS RN: 36554-97-9

N1038 5g 25g



Perfluoroethyl Perfluoroisopropyl Ketone
CAS RN: 756-13-8

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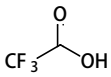
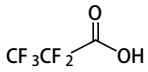
Fluorous Carboxylic Acids

T0431 25g 100g 500g



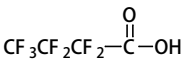
Trifluoroacetic Acid
CAS RN: 76-05-1

P1125 25g 100g



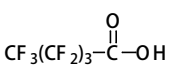
Pentafluoropropionic Acid
CAS RN: 422-64-0

H0024 25g 100g



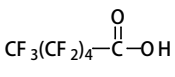
Heptafluorobutyric Acid
CAS RN: 375-22-4

N0605 5g 25g



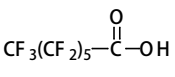
Nonafluorovaleric Acid
CAS RN: 2706-90-3

U0067 5g 25g



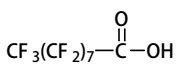
Undecafluorohexanoic Acid
CAS RN: 307-24-4

T1545 5g 25g



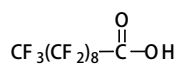
Tridecafluoroheptanoic Acid
CAS RN: 375-85-9

H0843 5g 25g



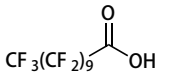
Heptadecafluorononanoic Acid
CAS RN: 375-95-1

N0607 5g



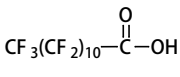
Nonadecafluorodecanoic Acid
CAS RN: 335-76-2

H1234 1g



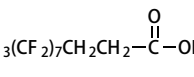
Heneicosafluoroundecanoic Acid
CAS RN: 2058-94-8

T2492 1g 5g



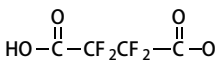
Tricosafluorododecanoic Acid
CAS RN: 307-55-1

H1502 1g



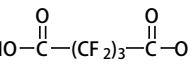
2*H*,2*H*,3*H*,3*H*-Heptadecafluoro-undecanoic Acid
CAS RN: 34598-33-9

T1621 5g 25g



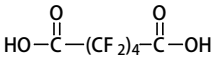
Tetrafluorosuccinic Acid
CAS RN: 377-38-8

H0658 5g 10g 25g



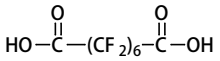
Hexafluoroglutaric Acid
CAS RN: 376-73-8

O0260 5g 25g



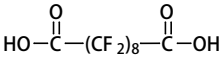
Octafluoroadipic Acid
CAS RN: 336-08-3

D2465 5g 25g



Dodecafluorosuberic Acid
CAS RN: 678-45-5

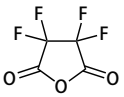
H0892 5g 25g



Hexadecafluorosebacic Acid
CAS RN: 307-78-8

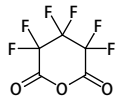
氟代酸酐
Fluorous Carboxylic Anhydrides

T2478 1g 5g



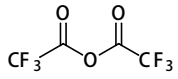
Tetrafluorosuccinic Anhydride
CAS RN: 699-30-9

H0745 5g 25g



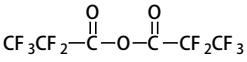
Hexafluoroglutaric Anhydride
CAS RN: 376-68-1

T0433 20mL 100mL 400mL



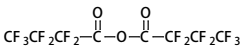
Trifluoroacetic Anhydride
CAS RN: 407-25-0

P0566 5g 25g



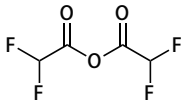
Pentafluoropropionic Anhydride
CAS RN: 356-42-3

H0337 10g



Heptafluorobutyric Anhydride
CAS RN: 336-59-4

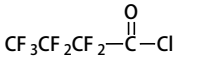
D4164 5g



Difluoroacetic Anhydride
CAS RN: 401-67-2

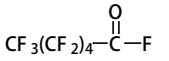
氟代卤化物
Fluorous Carboxylic Halides

H0508 5g 25g



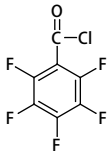
Heptafluorobutyryl Chloride
CAS RN: 375-16-6

U0075 5g



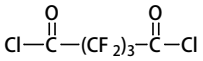
Undecafluorohexanoyl Fluoride
CAS RN: 355-38-4

P0807 5g 25g



Pentafluorobenzoyl Chloride
CAS RN: 2251-50-5

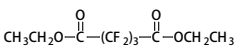
H0743 1g



Hexafluoroglutaryl Dichloride
CAS RN: 678-77-3

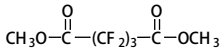
氟代酯
Fluorous Carboxylic Esters

H0744 1g



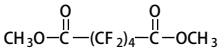
Diethyl Hexafluoroglutarate
CAS RN: 424-40-8

D3589 1g 5g



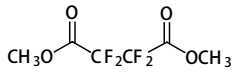
Dimethyl Hexafluoroglutarate
CAS RN: 1513-62-8

D3590 1g 5g



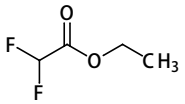
Dimethyl Octafluoroadipate
CAS RN: 3107-98-0

D3588 1g 5g



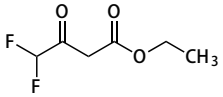
Dimethyl Tetrafluorosuccinate
CAS RN: 356-36-5

D2498 5g 25g



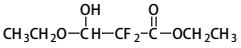
Ethyl Difluoroacetate
CAS RN: 454-31-9

E1018 25g



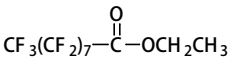
Ethyl 4,4-Difluoroacetoacetate
CAS RN: 352-24-9

E0547 1g



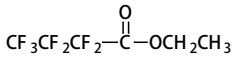
Ethyl 3-Ethoxy-2,2-difluoro-3-hydroxypropionate
CAS RN: 141546-97-6

H1038 5g



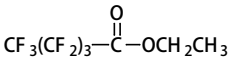
Ethyl Heptadecafluoro-nonanoate
CAS RN: 30377-52-7

H0594 5g 25g



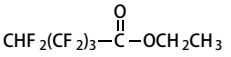
Ethyl Heptafluorobutyrate
CAS RN: 356-27-4

N0689 5g



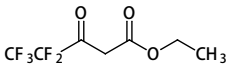
Ethyl Nonafluorovalerate
CAS RN: 424-36-2

E1022 5g 25g



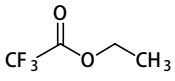
Ethyl 5*H*-Octafluorovalerate
CAS RN: 2795-50-8

P1062 5g



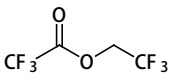
Ethyl Pentafluoro-propionylacetate
CAS RN: 663-35-4

T0432 25g 100g 500g



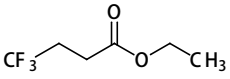
Ethyl Trifluoroacetate
CAS RN: 383-63-1

T1697 25g



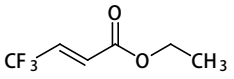
2,2,2-Trifluoroethyl Trifluoroacetate
CAS RN: 407-38-5

E0830 1g 5g



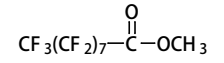
Ethyl 4,4,4-Trifluorobutyrate
CAS RN: 371-26-6

E0772 5g 25g



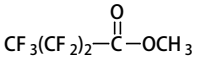
Ethyl 4,4,4-Trifluorocrotonate
CAS RN: 25597-16-4

M1915 5g 25g



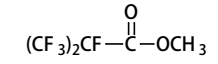
Methyl Heptadecafluoro-nonanoate
CAS RN: 51502-45-5

H1033 5g 25g



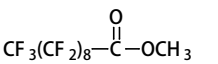
Methyl Heptafluorobutyrate
CAS RN: 356-24-1

M2022 5g 25g



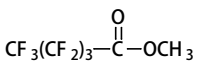
Methyl Heptafluoroisobutyrate
CAS RN: 680-05-7

M1916 5g 25g



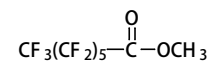
Methyl Nonadecafluoro-decanoate
CAS RN: 307-79-9

M1912 5g



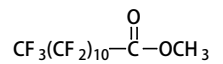
Methyl Nonafluorovalerate
CAS RN: 13038-26-1

M1914 5g 25g



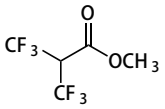
Methyl Tridecafluoro-heptanoate
CAS RN: 14312-89-1

M1917 5g 25g



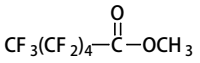
Methyl Tricosafluoro-dodecanoate
CAS RN: 56554-52-0

M2496 1g 5g



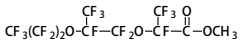
Methyl 2-(Trifluoromethyl)-3,3,3-trifluoropropionate
CAS RN: 360-54-3

M1913 5g



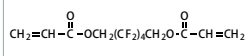
Methyl Undecafluorohexanoate
CAS RN: 424-18-0

M2030 5g



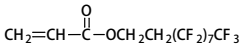
Methyl 2,5-Bis(trifluoromethyl)-3,6-dioxaundecafluorononanoate (mixture of isomers)
CAS RN: 26131-32-8

B5785 1g 5g



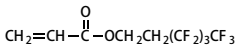
1,6-Bis(acryloyloxy)-2,2,3,3,4,4,5,5-octafluorohexane
CAS RN: 2264-01-9

A1330 10g



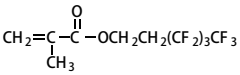
1*H*,1*H*,2*H*,2*H*-Heptadecafluorodecyl Acrylate
CAS RN: 27905-45-9

N0977 25g



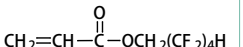
1*H*,1*H*,2*H*,2*H*-Nonafluorohexyl Acrylate
CAS RN: 52591-27-2

N1014 5g 25g



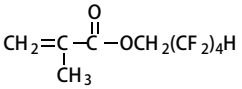
1*H*,1*H*,2*H*,2*H*-Nonafluorohexyl Methacrylate
CAS RN: 1799-84-4

O0318 5g 25g



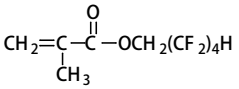
1*H*,1*H*,5*H*-Octafluoropentyl Acrylate
CAS RN: 376-84-1

O0481 5g 25g



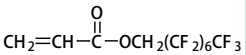
1*H*,1*H*,5*H*-Octafluoropentyl Methacrylate
CAS RN: 355-93-1

M1433 5g 25g



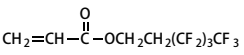
1*H*,1*H*,5*H*-Octafluoropentyl Methacrylate
CAS RN: 355-93-1

P1754 1g 5g 25g



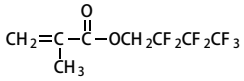
1*H*,1*H*-Pentadecafluoro-*n*-octyl Acrylate
CAS RN: 307-98-2

N1107 5g 25g



1*H*,1*H*,2*H*,2*H*-Nonafluorohexyl Acrylate
CAS RN: 2591-27-2

H1674 5g 25g



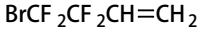
2,2,3,3,4,4,4-Heptafluorobutyl Methacrylate
CAS RN: 13695-31-3

氟代烷基卤化物
Fluorous Alkyl Halides

B2333 1g 5g

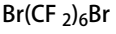
3-Bromo-3,3-difluoropropene
CAS RN: 420-90-6

B3222 5g 25g



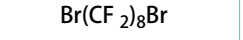
4-Bromo-3,3,4,4-tetrafluoro-1-butene
CAS RN: 18599-22-9

D3572 1g 5g



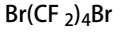
1,6-Dibromododecafluorohexane
CAS RN: 918-22-9

D3587 1g 5g



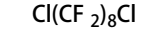
1,8-Dibromohexadecafluorooctane
CAS RN: 812-58-8

D3573 5g



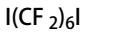
1,4-Dibromooctafluorobutane
CAS RN: 335-48-8

D2804 5g 25g



1,8-Dichlorohexadecafluorooctane
CAS RN: 647-25-6

D2333 10g

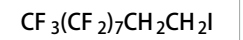


Dodecafluoro-1,6-diiodohexane
CAS RN: 375-80-4

H0844 5g 25g

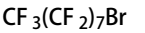
Heneicosafluorodecyl Iodide
CAS RN: 423-62-1

H1084 5g 25g



1*H*,1*H*,2*H*,2*H*-Perfluorodecyl Iodide
CAS RN: 2043-53-0

H0946 5g 25g

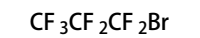


Perfluoro-*n*-octyl Bromide
CAS RN: 423-55-2

P1084 25g

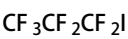
Perfluoro-*n*-octyl Iodide
CAS RN: 507-63-1

H0689 5g



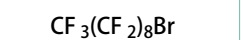
Heptafluoropropyl Bromide
CAS RN: 422-85-5

H0596 5g 25g



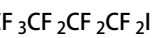
Perfluoropropyl Iodide
CAS RN: 754-34-7

N0808 5g



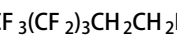
Nonadecafluorononyl Bromide
CAS RN: 558-96-3

N0499 25g 100g 500g



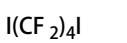
Nonafluorobutyl Iodide
CAS RN: 423-39-2

P1155 5g 25g



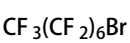
2-(Nonafluorobutyl)ethyl Iodide
CAS RN: 2043-55-2

D2329 5g 25g



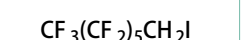
Octafluoro-1,4-diiodobutane
CAS RN: 375-50-8

P1753 5g



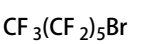
Pentadecafluoroheptyl Bromide
CAS RN: 375-88-2

T2482 1g 5g



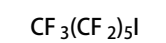
1*H*,1*H*-Tridecafluoroheptyl Iodide
CAS RN: 212563-43-4

T2479 5g 25g



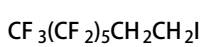
Tridecafluorohexyl Bromide
CAS RN: 335-56-8

T1098 5g 25g



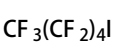
Tridecafluorohexyl Iodide
CAS RN: 355-43-1

T2074 5g 25g



1*H*,1*H*,2*H*,2*H*-Perfluoro-*n*-octyl Iodide
CAS RN: 2043-57-4

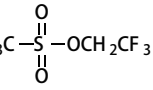
U0081 5g 25g



Undecafluoropentyl Iodide
CAS RN: 638-79-9

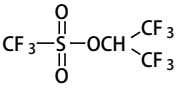
氟代磺酸及其衍生物
Fluorous Sulfonic Acids & their derivatives

T1604 5g 25g



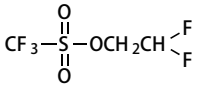
2,2,2-Trifluoroethyl Triflate
CAS RN: 6226-25-1

H1276 5g



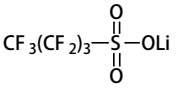
1,1,1,3,3,3-Hexafluoroisopropyl Triflate
CAS RN: 156241-41-7

D5299 1g 5g



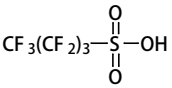
2,2-Difluoroethyl Trifluoromethanesulfonate
CAS RN: 74427-22-8

N0710 25g



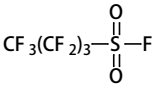
Lithium Nonafluoro-1-butanesulfonate
CAS RN: 131651-65-5

N0709 5g 25g



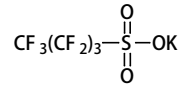
Nonafluoro-1-butanesulfonic Acid
CAS RN: 375-73-5

P1098 25g 100g 250g



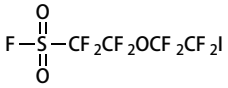
Perfluoro-1-butanesulfonyl Fluoride
CAS RN: 375-72-4

N0711 25g



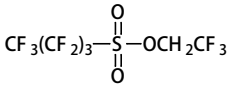
Potassium Nonafluoro-1-butanesulfonate
CAS RN: 29420-49-3

T2914 5g



Tetrafluoro-2-(tetrafluoro-2-iodoethoxy)-ethanesulfonyl Fluoride
CAS RN: 66137-74-4

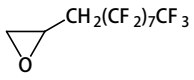
N0677 5g



2,2,2-Trifluoroethyl Perfluorobutanesulfonate
CAS RN: 79963-95-4

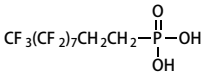
其它
Others

E0462 10g



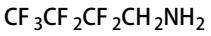
3-(Perfluoro-*n*-octyl)-propenoxide
CAS RN: 38565-53-6

H1459 200mg



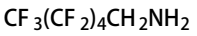
(1*H*,1*H*,2*H*,2*H*-Perfluoro-decyl)phosphonic Acid
CAS RN: 80220-63-9

H1300 1g 5g



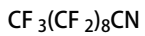
1*H*,1*H*-Perfluorobutylamine
CAS RN: 374-99-2

U0083 1g 5g



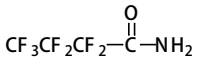
1*H*,1*H*-Undecafluorohexylamine
CAS RN: 355-34-0

N1095 1g 5g



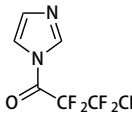
Nonadecafluorodecanenitrile
CAS RN: 379215-40-4

H0926 25g



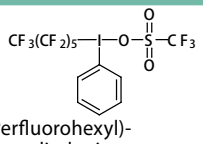
Heptafluorobutyramide
CAS RN: 662-50-0

H0467 5g 25g



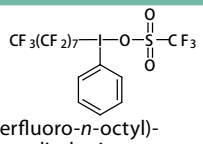
1-(Perfluorobutyryl)imidazole
CAS RN: 32477-35-3

P1080 1g



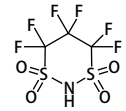
(Perfluorohexyl)-phenyliodonium Trifluoromethanesulfonate
CAS RN: 77758-84-0

P1081 1g



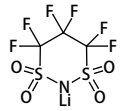
(Perfluoro-*n*-octyl)-phenyliodonium Trifluoromethanesulfonate
CAS RN: 77758-89-5

H1056 1g 5g



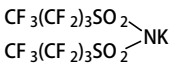
1,1,2,2,3,3-Hexafluoro-propane-1,3-disulfonimide
CAS RN: 84246-29-7

H1057 1g 5g



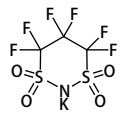
Lithium 1,1,2,2,3,3-Hexafluoro-propane-1,3-disulfonimide
CAS RN: 189217-62-7

N0712 1g 5g



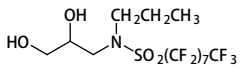
Potassium Bisnonafluoro-1-butanesulfonimidate
CAS RN: 129135-87-1

H1058 1g 5g



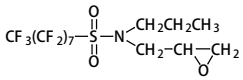
1,1,2,2,3,3-Hexafluoropropane-1,3-disulfonimide Potassium Salt
CAS RN: 588668-97-7

P1162 25g



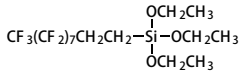
N-Propyl-*N*-(2,3-dihydroxypropyl)perfluoro-*n*-octylsulfonamide
CAS RN: 2262-49-9

P1163 25g



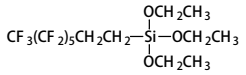
N-Propyl-*N*-(2,3-epoxypropyl)-perfluoro-*n*-octylsulfonamide
CAS RN: 77620-64-5

T2876 5g 25g



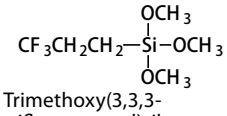
Triethoxy-1*H*,1*H*,2*H*,2*H*-heptadecafluorodecylsilane
CAS RN: 101947-16-4

T1770 5g 25g



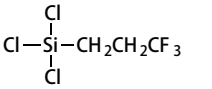
Triethoxy-1*H*,1*H*,2*H*,2*H*-tridecafluoro-*n*-octylsilane
CAS RN: 51851-37-7

T2720 5g 25g



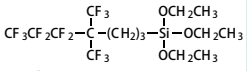
Trimethoxy(3,3,3-trifluoropropyl)silane
CAS RN: 429-60-7

T3518 25g



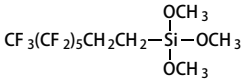
Trichloro(3,3,3-trifluoropropyl)silane
CAS RN: 592-09-6

T3246 1g 5g



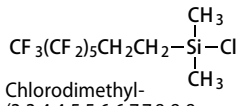
Triethoxy[5,5,6,6,7,7,7-heptafluoro-4,4-bis(trifluoromethyl)heptyl]silane
CAS RN: 130676-81-2

T3560 5g 25g



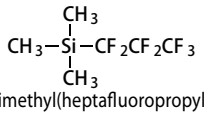
Trimethoxy(1*H*,1*H*,2*H*,2*H*-tridecafluoro-*n*-octyl)silane
CAS RN: 85857-16-5

C1857 1g 5g



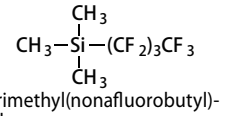
Chlorodimethyl-(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-*n*-octyl)silane
CAS RN: 102488-47-1

T3593 1g 5g



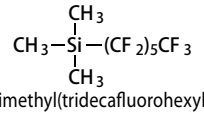
Trimethyl(heptafluoropropyl)-silane
CAS RN: 3834-42-2

T3594 1g 5g



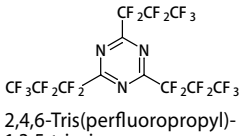
Trimethyl(nonafluorobutyl)-silane
CAS RN: 204316-01-8

T3595 1g 5g



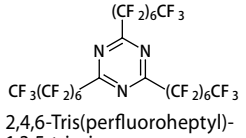
Trimethyl(tridecafluorohexyl)-silane
CAS RN: 135841-49-5

T0859 0.1mL



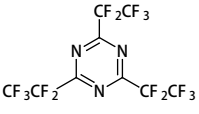
2,4,6-Tris(perfluoropropyl)-1,3,5-triazine
CAS RN: 915-76-4

T0828 100mg



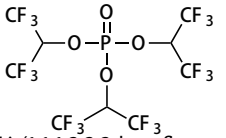
2,4,6-Tris(perfluoroheptyl)-1,3,5-triazine
CAS RN: 21674-38-4

T0858 0.1mL



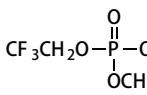
2,4,6-Tris(pentafluoroethyl)-1,3,5-triazine
CAS RN: 858-46-8

T3041 1g 5g



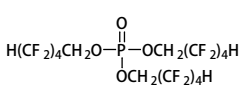
Tris(1,1,1,3,3,3-hexafluoro-2-propyl) Phosphate
CAS RN: 66489-68-7

T3203 5g 25g



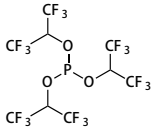
TTFPa
CAS RN: 358-63-4

P1134 10g



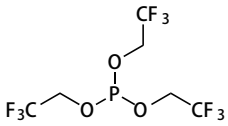
Tris(1*H*,1*H*,5*H*-octafluoro-pentyl) Phosphate
CAS RN: 355-86-2

T3353 1g 5g



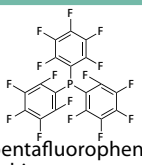
Tris(1,1,1,3,3,3-hexafluoro-2-propyl) Phosphite
CAS RN: 66470-81-3

T3991 5g 25g



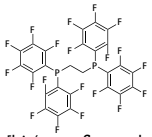
Tris(2,2,2-trifluoroethyl)-Phosphite
CAS RN: 370-69-4

T2484 1g 5g



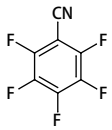
Tris(pentafluorophenyl)-phosphine
CAS RN: 1259-35-4

B3428 1g



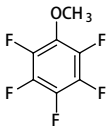
1,2-Bis[bis(pentafluorophenyl)-phosphino]ethane
CAS RN: 76858-94-1

P0935 5g 25g



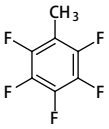
Pentafluorobenzonitrile
CAS RN: 773-82-0

P0918 5g 25g



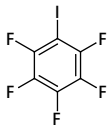
Pentafluoroanisole
CAS RN: 389-40-2

P1408 5g 25g



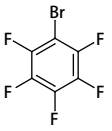
2,3,4,5,6-Pentafluorotoluene
CAS RN: 771-56-2

P1188 5g 25g



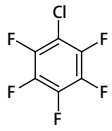
Pentafluoroiodobenzene
CAS RN: 827-15-6

B1116 5g 25g



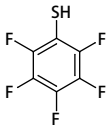
Bromopentafluorobenzene
CAS RN: 344-04-7

P0850 25g



Chloropentafluorobenzene
CAS RN: 344-07-0

P0861 5g 25g

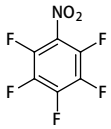


Pentafluorobenzenethiol
CAS RN: 771-62-0

P0922 5g 25g

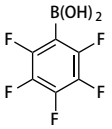
Pentafluoroaniline
CAS RN: 771-60-8

P1228 5g 25g



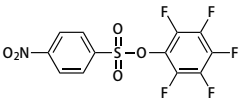
Pentafluoronitrobenzene
CAS RN: 880-78-4

P1904 1g 5g



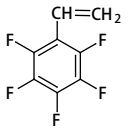
Pentafluorophenylboronic Acid
CAS RN: 1582-24-7

P2231 1g 5g



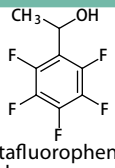
Pentafluorophenyl 4-Nitrobenzenesulfonate
CAS RN: 244633-31-6

P0862 5g 25g



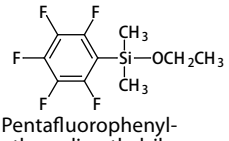
2,3,4,5,6-Pentafluorostyrene
CAS RN: 653-34-9

P0925 5g



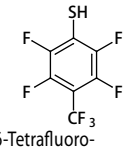
1-(Pentafluorophenyl)-ethanol
CAS RN: 830-50-2

P1242 1g



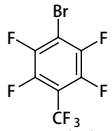
Pentafluorophenyl-ethoxydimethylsilane
CAS RN: 71338-73-3

T1542 1g 5g



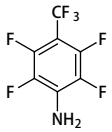
2,3,5,6-Tetrafluoro-4-(trifluoromethyl)benzenethiol
CAS RN: 651-84-3

T1541 10g



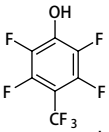
4-Trifluoromethyl-2,3,5,6-tetrafluorobromobenzene
CAS RN: 17823-46-0

T1529 1g 5g



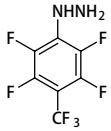
4-Aminoheptafluorotoluene
CAS RN: 651-83-2

T1983 5g



Perfluoro-*p*-cresol
CAS RN: 2787-79-3

H1034 5g



(Perfluoro-*p*-tolyl)-hydrazine
CAS RN: 1868-85-5

P0926 5g 25g

Pentafluoropyridine
CAS RN: 700-16-3

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