Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Саранск (8342)22-96-24
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Сыктывкар (8212)25-95-17
Тамбов (4752)50-40-97
Тверь (4822)63-31-35
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Чита (3022)38-34-83
Якутск (4112)23-90-97
Ярославль (4852)69-52-93

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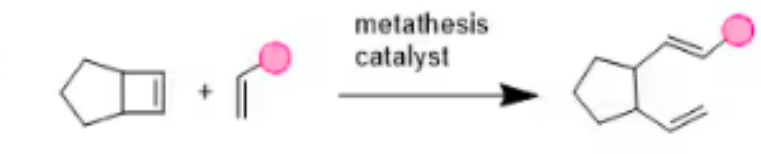
Технические характеристики на метатезис олефинов, катализаторы переходных металлов, фосфиновые лиганды компании Sigma-Aldrich

Виды товаров: титановые катализаторы, ванадиевые катализаторы, железные катализаторы, кобальтовые катализаторы, никелевые катализаторы, медные катализаторы, цинковые катализаторы, циркониевые катализаторы, рутениевые катализаторы, родиевые катализаторы, палладиевые катализаторы, серебряные катализаторы, монодентатные фосфиновые лиганды и предшественники, бидентатные фосфиновые лиганды и предшественники, бухвальдские лиганды, дальфос лиганды.

Olefin Metathesis



We are committed to helping you reach new frontiers through an ever-ing, always innovative portfolio of products for olefin metathesis. In line with this goal, we have partnered with Umicore PMC to bring you an outstanding range of olefin metathesis catalysts for chemical synthesis. Our exclusive collaboration not only gives you direct access to Umicore's Grubbs Catalyst® technology, but also their development expertise. You'll enjoy rapid, reliable supply of milligram to multi-kilogram volumes, at the best value, with Umicore license rights included. Moreover, you'll benefit from dedicated technical guidance, supported by Nobel Laureate Robert Grubbs.

SELECTED BEST METATHESIS PRACTICES

Consider Concentration: Run cross-metathesis reactions concentrated and macrocyclization reactions diluted.

Oust Oxygen: Degassing reactions with an inert gas prior to adding a Grubbs catalyst can improve catalyst lifetime and efficiency. Degassing during the reaction has the added benefit of efficiently removing ethylene from metathesis reactions where it is generated.

Solvent Selection: Consider solubility and use non-coordinating solvents when possible, such as cyclohexane, toluene, or dichloromethane.

For more suggestions on metathesis reaction planning and troubleshooting, view the Metathesis Application Guide

EASY ACCESS TO GRUBBS CATALYST® TECHNOLOGY

Enjoy unparalleled access to Grubbs Catalyst® technology and experience the many benefits of our exclusive partnership.

Secure supply chain of metathesis catalysts from milligram to multi-kilogram volumes

Rapid delivery of R&D quantities

Access to technical expertise, supported by Nobel Laureate Robert Grubbs

Umicore license rights included in listed product price

915742

Grubbs Catalyst® M208

PROPERTIES

100
powder
>300 °C
1S/C23H28N2.C18H33P.C5H4S.2ClH.Ru/c1-14-9-16(3)22(17(4)10-14)24-13-25(21(8)20(24)7)23-18(5)11-15(2)12-19(23)6;1-4-10-16(11-5-1)19(17-12-6-2-7-13-17)18-14-8-3-9-15-18;1-5-3-2-4-6-5;;;/h9-12H,1-8H3;16-18H,1-15H2;1-4H;2*1H;/q;;;;;+2/p-2
NMUNQTSQYLEOMN-UHFFFAOYSA-L

DESCRIPTION

Application

Umicore Grubbs Catalyst M208 is a homogeneous catalyst useful for alkene metathesis, especially for cross-metathesis, ring-closing metathesis and self-metathesis.

Learn more about our metathesis catalysts

Storage and Stability

Do not store above 25°C (77°F). Store in a tightly closed original container under dry inert gas, protected from direct sunlight in a dry, cool and well-ventilated area.

Legal Information

Product of Umicore

This product, its manufacturing or use, is the subject of one or more issued or pending U.S. Patents (and foreign equivalents) owned or controlled by Umicore PMC. The purchase of this product from Umicore PMC through Sigma-Aldrich, its affiliates or their authorized distributors conveys to the buyer a limited, one-time, non-exclusive, non-transferable, non-assignable license. Buyer's use of this product may infringe patents owned or controlled by third parties. It is the sole responsibility of buyer to ensure that its use of the product does not infringe the patent rights of third parties or exceed the scope of the license granted herein.

569747

Grubbs Catalyst® M204

PROPERTIES

100
solid
core: ruthenium
reagent type: catalyst
reaction type: Ring-Opening Polymerization

143.5-148.5 °C
2-8°C

CC1=CC(C)=CC(C)=C1N2CCN(C3=C(C)C=C(C)C=C3C)C2=[Ru](Cl)(Cl)=CC4=CC=CC=C4.P(C5CCCCC5)(C6CCCCC6)C7CCCCC7
1S/C21H26N2.C18H33P.C7H6.2ClH.Ru/c1-14-9-16(3)20(17(4)10-14)22-7-8-23(13-22)21-18(5)11-15(2)12-19(21)6;1-4-10-16(11-5-1)19(17-12-6-2-7-13-17)18-14-8-3-9-15-18;1-7-5-3-2-4-6-7;;;/h9-12H,7-8H2,1-6H3;16-18H,1-15H2;1-6H;2*1H;/q;;;;;+2/p-2
FCDPQMAOJARMTG-UHFFFAOYSA-L
Related Categories

DESCRIPTION

Application

Grubbs Catalyst® M204 can be used as a catalyst for ring-closing metathesis (RCM), cross-metathesis, and ring-opening metathesis polymerization (ROMP).[1][2][3] It is also used to synthesize trisubstituted olefins with excellent functional group tolerance and selectivity via cross-metathesis and ring closing metathesis reactions.[4][5]
It can also be used as a catalyst:

To synthesize coumarins from phenolic compounds via RCM.[1]

To cleave secondary (*E*)-allyl *vic*-diols to aldehydes.[6]

For small scale and high throughput uses, product is also available as ChemBeads (**919764**)

923125

Grubbs Catalyst® M801

PROPERTIES

100
powder
>200 °C
Cl[Ru](c1n(C2=C(C)C=C(C)C=C2C)CCn1C3=C(C)C=C(C)C=C3C)(Cl)(c4n(C5=C(C)C=C(C)C=C5C)CCn4C6=C(C)C=C(C)C=C6C)=CC7=CC=CC=C7

DESCRIPTION

Application

Grubbs Catalyst® M801 is a highly latent metathesis catalysts that can be mixed with reactive monomers and not initiate at ambient temperature.

915246

Grubbs catalyst® M203

PROPERTIES

100
powder
230 °C (decomp)
CC1=CC(C)=CC(C)=C1n2c([Ru](Cl)(Cl)(P(C3CCCCC3)(C4CCCCC4)C5CCCCC5)=C6C(C=CC=C7)=C7C(C8=CC=CC=C8)=C6)n(C9=C(C)C=C(C)C=C9C)C=C2
1S/C21H24N2.C18H33P.C15H10.2ClH.Ru/c1-14-9-16(3)20(17(4)10-14)22-7-8-23(13-22)21-18(5)11-15(2)12-19(21)6;1-4-10-16(11-5-1)19(17-12-6-2-7-13-17)18-14-8-3-9-15-18;1-2-6-12(7-3-1)15-11-10-13-8-4-5-9-14(13)15;;;/h7-12H,1-6H3;16-18H,1-15H2;1-9,11H;2*1H;/q;;;;;+2/p-2
HBNBIWQQLMQFEU-UHFFFAOYSA-L

Related Categories

DESCRIPTION

Application

Umicore Grubbs Catalyst M203 is a homogeneous catalyst useful for alkene metathesis, especially for cross-metathesis, ring-closing metathesis and self-metathesis.

Transition Metal Catalysts

Transition metals make excellent catalysts as they have incompletely filled d-orbitals that allow them to both donate and accept electrons easily from other molecules. Some of the early transition metal catalyzed reactions are still being used today. Despite their long history in catalysis, the discovery of new transition metal catalysts and making catalytic processes more efficient still remains an active area of research.

In addition, with the development of supporting ligands, they have evolved as a useful tool for various synthetic and non-synthetic transformations. Some examples of the transformations using transition metal catalysts include Stille, Buchwald-Hartwig, Negishi, Heck, Miyaura-Suzuki, and Sonogashira reactions.

TITANIUM CATALYSTS

We offer a variety of titanium complexes with different organic ligands for use as catalysts during organic synthesis. For example, $CpTiCl_3$ has been employed as an effective titanium catalyst for room-temperature heterocycle annulation reactions. Other examples include the use of titanocene dichloride to convert electron-deficient olefins to diastereomerically pure 7-hydroxynorbornenes and bis(methylcyclopentadienyl)titanium dichloride for the transformation of methyl acrylates to highly substituted norbornene derivatives.

VANADIUM CATALYSTS

The use of vanadium as a catalyst is the second largest application for vanadium after its use as an additive to improve steel production. A vanadium catalyst can effectively activate peroxides and selectively oxidize substrates like bromides, sulfides, and alkenes. These catalysts effectively transfer oxygen atoms to a substrate that is used for obtaining valuable oxidized molecules on a large-scale reaction with a high degree of selectivity. Additionally, vanadium catalysts are efficient catalysts for olefin polymerization. Vanadium oxides can be applied in the emission standards for vehicles and the desulfurization of crude oils. Moreover, the use of ecological oxidants, e.g., hydrogen and

alkyl hydroperoxide, significantly increases the potential application of vanadium catalysts at an industrial level.

IRON CATALYSTS

Iron and iron compounds are widely used as reagents or catalysts. For example, ferric chloride and bromide have long been used as Lewis acid iron catalysts in the classic electrophilic aromatic substitution reactions. Iron complexes with organic ligands are of particular interest and can serve as environmentally friendly Fe catalysts for a host of transformations. Illustrating this point is the very useful role that iron catalysis plays in the timely study of ammonia-borane dehydrogenation process.

COBALT CATALYSTS

Being both economical and ecological, cobalt catalysts have attracted intense interest for cross-coupling reactions. Cobalt catalysts are highly active reagents, extensively applied in the efficient and selective synthesis of pharmaceuticals, natural products, and new materials. These catalysts show a higher reactivity for various carbon-carbon bond formation reactions. Cobalt salts as catalysts show good functional group tolerance, high chemo-selectivity, and require mild reaction conditions in comparison to palladium and nickel, the most commonly used catalysts for metal-catalyzed cross-coupling.

NICKEL CATALYSTS

Nickel catalysts play a central role in many synthetic transformations ranging from carbon-carbon cross coupling reactions to the reduction of electron-rich carbon bonds with Raney nickel. These **nickel catalysts** span a range of oxidation states: Nickel (0), nickel (II), nickel (III) and nickel (IV). The Ni catalysts available for immediate purchase are aluminum nickel (Al Ni) alloys, ammonium nickel hydrates, Ni COD, Ni halides (chlorides, bromides, fluorides and iodides), Ni cyclopentadienyls, nickel metal, nickel acac, and Raney Nickel— products of W.R. Grace and Company.

COPPER CATALYSTS

Copper catalysts are useful for milder reaction conditions and show excellent yields, however the chemical reactions are slow and require high temperatures. Among transition-metal mediated reactions to form carbon-carbon bonds and carbon-heteroatom bonds, copper catalysts are used in Ullmann reactions, Diels-Alder reactions, ring expansions, Castro-Stevens coupling, the Kharasch-Sosnovsky reaction, and a notable variant of the Huisgen 1,3-dipolar cycloaddition utilizing a Cu(I) catalyst developed independently by Meldal and Sharpless. We provide efficient copper catalysts and pre-catalysts as well as copper-containing Metal Organic Framework (MOF) components for all your copper catalysis needs.

ZINC CATALYSTS

Zinc catalysts find wide applicability in synthetic chemistry and organic synthesis. A zinc chloride catalyst, acting as a moderate-strength Lewis acid, can catalyze the Fischer Indole synthesis to convert aryl hydrazones to indoles, and the Friedel-Crafts Acylation to produce monoacylated products from arenes and acyl chlorides. In addition to $ZnCl_2$, a zinc oxide catalyst can be useful in a variety of catalytic conversions. We also offer additional **zinc catalysts**, such as various zinc halides, that catalyze stereospecific and regioselective reactions. In addition to the catalytic properties, our zinc compounds also find applications in material science as chemiluminescent quantum dots and nanomaterials. Our zinc compounds may also be used as starting materials in the preparation of organozinc reagents used in Negishi coupling.

ZIRCONIUM CATALYSTS

The zirconium-catalyzed asymmetric carboalumination (ZACA) reaction, developed by Nobel laureate Ei-ichi Negishi, is perhaps one of the best-known examples of use of **zirconium catalyst**. The ZACA reaction provides a means for chiral functionalization of alkenes with organoaluminum agents, catalyzed by a chiral bis(indenyl)zirconium catalyst. Another notable zirconium catalyst is zirconium dioxide or zirconia. The list of applications of zirconia catalyst in heterogeneous catalysis is rapidly growing. Some of the applications include: decomposition of nitric oxide, reduction of carboxylic acid to aldehydes, selective dehydration of secondary alcohols to terminal alkenes, and hydrogenation of carbon monoxide to isobutane.

RUTHENIUM CATALYSTS

Ruthenium Catalysts

Selective oxidative transformation of various functional groups with environment friendly and easily accessible oxidants can be readily achieved with a proper ruthenium catalyst. **Ruthenium catalysts** can be very powerful tool in synthetic chemistry for selective catalysis of oxidative transformations such as asymmetric epoxidation of alkenes, generation of dioxygen species, dihydroxylation of olefins, and oxidative dehydrogenation of alcohols.

Ruthenium catalysts are also widely employed in metathesis reactions, with Grubbs' catalysts being the most well-known in the field of olefin metathesis. The wide popularity of Grubb's catalysts can be explained by their high tolerance of various functional groups, and their high stability in air and a plethora of solvents.

RHODIUM CATALYSTS

The **rhodium catalyst** is a suitable promoter, used to activate carbon-hydrogen(C-H) bonds, and has emerged as a challenging and attractive tool for catalysis. Rhodium catalysis finds increasing interest in the catalytic dehydrogenative cross-coupling, allowing elegant C-C bond construction. Although palladium has been the metal of choice for most examples, Rh catalysts can also be suitable promoters for this activation. Additionally, rhodium provides access to important couplings, such as aryl-aryl, aryl-alkene, and alkene-alkene, as viable routes to valuable organic frameworks.

PALLADIUM CATALYSTS

The ability to fine tune the reaction conditions (temperature, solvents, ligands, bases and other additives) of **palladium catalysts** makes palladium catalysis an extremely versatile tool in organic chemical synthesis. Furthermore, palladium catalysts have a very high tolerance of various functional groups and are often able to provide excellent stereo- and regio- specificity, which helps to avoid the need for protecting groups. It forms a highly versatile group of catalysts, known for use in carbon bond forming reactions (primarily C-C, C-O, C-N and C-F), such as Heck coupling, Suzuki coupling, Stille coupling, Hiyama coupling, Sonogashira coupling, Negishi coupling, and Buchwald-Hartwig amination, among others.

In heterogeneous catalysis, palladium catalysts, such as the Lindlar catalyst (or Lindlar's Palladium), are highly efficient at facilitating selective hydrogenation. This includes the conversion of triple bonds to cis-double bonds, monohydrogenation of polyolefins, and hydrogenation of azides to amines.

We welcome you to review our extensive offering of highly versatile homogeneous and heterogeneous palladium catalysts. For even greater convenience in purification and post-reaction cleanup, we have also included a selection of supported Pd catalysts, as well as a full line of recyclable and immobilized Pd Encat® catalysts that are suitable for various bond-formation and hydrogenation/reduction reactions.

SILVER CATALYSTS

Our portfolio also offers a wide variety of high-quality **silver catalysts** for transition-metal catalysis in organic synthesis. Silver catalysts are commonly used due to the high oxidation power and high oxidation potential of silver complexes. Additionally, they also serve as silver activators and enhance the electronegativity of other catalysts, such as gold. Organic and inorganic synthesis benefit from the stoichiometric oxidation potential of silver compounds. Homogeneous silver-catalyzed organic transformations highlight the unique redox chemistry of silver, capable of catalyzing reactions with high stereo- and regioselectivity. Silver catalysts efficiently mediate both intermolecular as well as intramolecular bond formations. Heterogeneous processes involving silver catalysis include NO_x reduction and catalytic oxidation of carbon monoxide (CO) to carbon dioxide (CO_2). Silver(I) salts are also used in several silver-catalyzed nucleophilic addition reactions and organic transformations.

PLATINUM CATALYSTS

We provide efficient **platinum catalysts**, e.g., platinum dioxide, also called Adams' catalyst, for the hydrogenation of various functional groups and dehydrogenation reactions in organic synthesis. Platinum black, the active Pt catalyst, is formed during the reaction. Utilizing platinum catalysis on alkynes results in syn-addition, forming a cis-alkene. Two of the most important transformations using platinum catalysts include the hydrogenation of nitro compounds to amines and ketones to alcohols. Notably, reductions of alkenes can also be performed with Adams' catalyst in the presence of nitro groups without reducing the nitro group. Platinum catalysts are preferred over palladium catalysts to minimize hydrogenolysis when reducing nitro compounds to amines. This Pt catalyst is also used for the hydrogenolysis of phenyl phosphate esters, a reaction that does not occur with palladium catalysts.

GOLD CATALYSTS

Prior to the 1980s, **gold** was regarded as having little catalytic activity. Advancements, spearheaded by F. Dean Toste (University of California, Berkeley) and others, have propelled gold into the forefront of transition metal catalysis. In particular, phosphine-ligated gold(I) complexes have recently emerged as powerful C–C bond forming catalysts capable of performing a variety of reactions under mild conditions. The list of useful C–C bond construction methods includes cyclopropanations, enyne isomerizations, Rautenstrauch rearrangements, ene reactions, and ring expansions. Typically, the catalyst system relies on a phosphine gold(I) chloride complex in combination with a silver salt co-catalyst to generate the active species *in situ*.

911984
(2,2′-Bipyridine)diiodonickel(II)

731382
(2*R*,2′*R*-(+)-[*N*,*N*′-Bis(2-pyridylmethyl)]-2,2′-bipyrrolidinebis(acetonitrile)iron(II) hexafluoroantimonate

902063
(2Z,6Z)-N'2,N'6-Dicyanopyridine-2,6-bis(carboximidamide)

911534
(4,4'-dMeObpy)$NiCl_2$

681563
(6-Bromo-1-oxohexyl)ferrocene

681571
(6-Bromohexyl)ferrocene

902985
(Bathocuproine)$NiBr_2$

902993
(BPhen)Ni$(OAc)_2$.xH_2O

911402
(CyPAd-DalPhos)NiCl(otol)
≥95%

119342
(Dimethylaminomethyl)ferrocene
≥95%

802948
(dppf)Ni(*o*-tolyl)Cl

923508
(*iPr*MPhos)$PdCl_2$
1:1 complex with CH_2Cl_2, ≥95%

911844
(Me$_4$Phen)$NiCl_2$

918105
(MeBPl)$_2$Ni
≥95%

919365

(MeBPI)Ni-OAc

317632
(Methylcyclopentadienyl)manganese(I) tricarbonyl

900592
(PAd-DalPhos)NiCl(otol)

905070
[(TEEDA)Ni(*o*-tolyl)Cl]
≥95%

804398
[(TMEDA)Ni(*o*-tolyl)Cl]
95%

470554
[1,1′-Bis(diphenylphosphino)ferrocene]dichloronickel(II)
97%

697230
[1,1′-Bis(diphenylphosphino)ferrocene]dichloropalladium(II)

710393
1,1′-Dibromoferrocene
97%

109576
1,1′-Dimethylferrocene
95%

496391
1,1′-Ferrocenedicarboxaldehyde
96%

372625
1,1′-Ferrocenedimethanol
97%

913154
1,10-Phenanthroline nickel (II) dibromide

916129
1,10-Phenanthroline nickel (II) dichloride

913278
[1,2-Bis(diphenylphosphino)ethane]dibromonickel(II)
≥95%

328219
[1,2-Bis(diphenylphosphino)ethane]dichloronickel(II)

335363
[1,3-Bis(diphenylphosphino)propane]dichloronickel(II)

804533
2,2′-Bipyrazine

257575
2,3,7,8,12,13,17,18-Octaethyl-21*H*,23*H*-porphine manganese(III) chloride
97%

269948
2,3,7,8,12,13,17,18-Octaethyl-21*H*,23*H*-porphine nickel(II)
97%

766127
2,5-Dilfuoro-4-methoxyphenylzinc bromide solution
0.6 M in THF

904937
2,6-Bis(*N*-pyrazolyl)pyridine nickel (II) dichloride
≥95% anhydrous basis

907111
2,6-bis(*N*-pyrazolyl)pyridine nickel(II) bromide

806439
2,6-Difluoroanilino(oxo)acetic acid

806412
2,6-Dimethylanilino(oxo)acetic acid

930873
[3-(2,4,6-Trimethylbenzyl)-1-(2,6-diisopropylphenyl)-4,5-dimethylimidazolylidene]copper chloride
≥95%

931268
[3-(2,4,6-Trimethylbenzyl)-1-(2,6-diisopropylphenyl)-4,5-dimethylimidazolylidene]gold chloride

931608
[3-(2,4,6-Trimethylbenzyl)-1-(2,6-diisopropylphenyl)-4,5-dimethylimidazolylidene]silver chloride

766135
3-Butenylzinc bromide solution
0.6 M in THF

309265
[3,4-Toluenedithiolato(2$^-$)]zinc hydrate

920223
3,6-Di-*tert*-butyl-9-(2,6-dimethylphenyl)-10-(4-(trifluoromethyl)phenyl)acridin-10-ium tetrafluoroborate
≥95%

902039
4-Methoxypicolinimidamide hydrochloride
≥95%

903000
[4,4′-Bis(1,1-dimethylethyl)-2,2′-bipyridine] nickel (II) dichloride

903019
[4,4′-Dimethyl-2,2′-bipyridine]nickel(II) dichloride hydrate
≥95%

275867
5,10,15,20-Tetrakis(4-methoxyphenyl)-21*H*,23*H*-porphine cobalt(II)

252913
5,10,15,20-Tetrakis(pentafluorophenyl)-21*H*,23*H*-porphyrin iron(III) chloride
≥95% (HPLC)

254754
5,10,15,20-Tetraphenyl-21*H*,23*H*-porphine manganese(III) chloride
95%

252204
5,10,15,20-Tetraphenyl-21*H*,23*H*-porphine nickel(II)
dye content ≥95 %

283649
5,10,15,20-Tetraphenyl-21*H*,23*H*-porphine vanadium(IV) oxide

106860
Acetylferrocene
95%

222380
Allylpalladium(II) chloride dimer
98%

497363
Ammonium cobalt(II) sulfate hexahydrate
99%

204749
Ammonium hexafluorotitanate
99.99% trace metals basis

F1543
Ammonium iron(II) sulfate hexahydrate
BioXtra, ≥98%

215406
Ammonium iron(II) sulfate hexahydrate
ACS reagent, 99%

398128
Ammonium metavanadate
ACS reagent, ≥99.0%

277908
Ammonium molybdate
99.98% trace metals basis

M1019
Ammonium molybdate tetrahydrate
BioReagent, suitable for cell culture, suitable for insect cell culture, 81.0-83.0% MoO_3 basis

A7302
Ammonium molybdate tetrahydrate
ACS reagent, 81.0-83.0% MoO_3 basis

431346
Ammonium molybdate tetrahydrate
ACS reagent, 99.98% trace metals basis

574988
Ammonium nickel(II) sulfate hexahydrate
99.999% trace metals basis

A1827
Ammonium nickel(II) sulfate hexahydrate
≥98%

342165
Ammonium phosphomolybdate hydrate

12801
Ammonium tetrachlorocuprate(II) dihydrate
purum, ≥98%

323446
Ammonium tetrathiomolybdate
99.97% trace metals basis

677264
APhos
95%

208108
Barium titanate(IV)
powder, <3 µm, 99%

119318
Benzene-chromium(0) tricarbonyl
98%

900768
Berkessel-Katsuki epoxidation catalyst
≥98%

728551
Bis[(2-dimethylamino)phenyl]amine nickel(II) chloride
≥97% (AT)

762504
Bis[(tetrabutylammonium iodide)copper(I) iodide]
95%

900920
Bis[[diisopropylphosphino]methyl]-4-methyl-pyridine bis(pivaloyloxy)cobalt
95%

696250
Bis(1,3-bis(2,6-diisopropylphenyl)imidazol-2-ylidene)copper(I) tetrafluoroborate

244988
Bis(1,5-cyclooctadiene)nickel(0)

RNI00137
Bis(acetonitrile)bromodicarbonyl(η^3-2-propen-1-yl)-molybdenum
Aldrich^{CPR}

227749
Bis(acetylacetonato)dioxomolybdenum(VI)

493651
Bis(benzene)chromium(0)
97%

447862
Bis(butylcyclopentadienyl)zirconium(IV) dichloride
97%

381004
Bis(cyclopentadienyl)chromium(II)
95%

279811
Bis(cyclopentadienyl)cobalt(III) hexafluorophosphate
98%

483656
Bis(cyclopentadienyl)dimethylzirconium(IV)

97%

119334
Bis(cyclopentadienyl)hafnium(IV) dichloride
98%

N7524
Bis(cyclopentadienyl)nickel(II)

234826
Bis(cyclopentadienyl)titanium(IV) dichloride
97%

510807
Bis(cyclopentadienyl)tungsten(IV) dihydride
97%

223670
Bis(cyclopentadienyl)zirconium(IV) chloride hydride
95%

196215
Bis(cyclopentadienyl)zirconium(IV) dichloride
≥98%

442305
Bis(ethylenediamine)copper(II) hydroxide solution
M in H_2O

710490
Bis(isopropylcyclopentadienyl)manganese
97%

512559
Bis(isopropylcyclopentadienyl)tungsten(IV) dihydride

510475
Bis(methylcyclopentadienyl)nickel(II)
97%

566748
Bis(pentafluorophenyl)zinc
97%

493678
Bis(pentamethylcyclopentadienyl)cobalt(III) hexafluorophosphate
98%

378542
Bis(pentamethylcyclopentadienyl)iron(II)
97%

708526
Bis(tricyclohexylphosphine)nickel(II) dichloride
97%

437093
[Bis(trimethylsilyl)acetylene](hexafluoroacetylacetonato)copper(I)

213934
Bis(triphenylphosphine)dicarbonylnickel

237116
Bis(triphenylphosphine)nickel(II) dichloride
synthesis grade

725242
Bromoferrocene

327638
Bromopentacarbonylrhenium(I)
98%

572144
Bromotris(triphenylphosphine)copper(I)
98%

265330
Cadmium
granular, ≥99%, 5-20 mesh

414891
Cadmium
granular, 30-80 mesh, ≥99%

265365
Cadmium
powder, −100 mesh, 99.5% trace metals basis

289159
Cadmium acetate dihydrate
reagent grade, 98%

229490
Cadmium acetate hydrate
≥99.99% trace metals basis

517585
Cadmium acetylacetonate
≥99.9% trace metals basis

289140
Cadmium carbonate
powder, 98%

202908
Cadmium chloride
99.99% trace metals basis

239208
Cadmium chloride hemi(pentahydrate)
ACS reagent, 79.5-81.0%

529575
Cadmium chloride hydrate
99.995% trace metals basis

208299
Cadmium chloride hydrate
98%

228516
Cadmium iodide
99%

229520

Cadmium nitrate tetrahydrate
99.997% trace metals basis

642045
Cadmium nitrate tetrahydrate
98%

244783
Cadmium oxide
powder, 99.5% trace metals basis

202894
Cadmium oxide
≥99.99% trace metals basis

401374
Cadmium perchlorate hydrate

529567
Cadmium perchlorate hydrate
99.999% trace metals basis

481882
Cadmium sulfate
≥99.99% trace metals basis

383082
Cadmium sulfate
ACS reagent, ≥99.0%

202924
Cadmium sulfate hydrate
≥99.995% trace metals basis

761435
cataCXium® A Pd G3
95%

900349
cataCXium Pd G4

925209
Chiralyst Ru637
Umicore

715425
Chloro[1,3-Bis(2,4,6-trimethylphenyl)imidazol-2-ylidene]copper(I)
95%

696307
Chloro[1,3-bis(2,6-diisopropylphenyl)imidazol-2-ylidene]copper(I)

763357
Chloro(1,5-cyclooctadiene)copper(I) dimer
95%

794279
Chloro(2-methylphenyl)bis(triphenylphosphine)nickel(II)

900941
Chloro(4-cyanophenyl)[(*R*)-1-[(*S*)-2-[bis(4-fluorophenyl]phosphino]ferrocenyl]ethyldi-*tert*-butylphosphine]nickel(II)
≥95%

900943
Chloro(4-cyanophenyl)[(*R*)-1-[(*S*)-2-(dicyclohexylphosphino)ferrocenyl]ethyldicyclohexylphosphine]nickel(II)

900942
Chloro(4-cyanophenyl)[(*R*)-1-[(*S*)-2-(dicyclohexylphosphino)ferrocenyl]ethyldiphenylphosphine]nickel(II)
≥95%

900944
Chloro(4-cyanophenyl)[(*R*)-1-[(*S*)-2-(diphenylphosphino)ferrocenyl]ethylditertbutylphosphine]nickel(II)
≥95%

341630
Chloro(pyridine)bis(dimethylglyoximato)cobalt(III)

361844
Chlorotris(triphenylphosphine)cobalt(I)
97%

266264
Chromium
powder, 99.5%, −100 mesh

266299
Chromium
powder, ≥99% trace metals basis, <45 µm

266299
Chromium
powder, ≥99% trace metals basis, <45 µm

244805
Chromium(II) chloride
95%

200050
Chromium(III) chloride
purified by sublimation, 99%

239259
Chromium(III) nitrate nonahydrate
99%

901166
***cis*-[2,2′-Bis(diphenylphosphino)-1,1′-binaphthyl](2-methylphenyl)nickel(II) chloride**

266639
Cobalt
powder, 2 µm particle size, 99.8% trace metals basis

266655
Cobalt
pieces, 99.5% trace metals basis

60811
Cobalt carbonyl
moistened with hexane (hexane 1-10%), ≥90% (Co)

403024
Cobalt(II) acetate tetrahydrate
ACS reagent, ≥98.0%

727970
Cobalt(II) acetylacetonate
≥99.0% (KT)

334030
Cobalt(II) bromide hydrate

255599
Cobalt(II) chloride hexahydrate
ACS reagent, 98%

230375
Cobalt(II) nitrate hexahydrate
reagent grade, 98%

239267
Cobalt(II) nitrate hexahydrate
ACS reagent, ≥98%

CDS004010
cobalt(ii) sulfate heptahydrate
Aldrich[CPR]

904104
$CoCl_2(PCy_3)_2$

61139
Copper
turnings, purum p.a., ≥99.0%

12816
Copper
foil, ≥99.8% (complexometric)

266086
Copper
powder, <425 µm, 99.5% trace metals basis

311405
Copper
ACS reagent, granular, 10-40 mesh, ≥99.90%

223409
Copper
shot, −3-+14 mesh, 99%

CDS007432
copper oxychloride
Aldrich[CPR]

403342

Copper(I) acetate
97%

254185
Copper(I) bromide
99.999% trace metals basis

212865
Copper(I) bromide
98%

230502
Copper(I) bromide dimethyl sulfide complex
99%

229628
Copper(I) chloride
≥99.995% trace metals basis

212946
Copper(I) chloride
reagent grade, 97%

224332
Copper(I) chloride
ReagentPlus®, purified, ≥99%

651745
Copper(I) chloride
AnhydroBeads™, ≥99.99% trace metals basis

205540
Copper(I) iodide
98%

682500
Copper(I) thiophene-2-carboxylate

217557
Copper(II) acetate monohydrate
ACS reagent, ≥98%

C87851
Copper(II) acetylacetonate
97%

221775
Copper(II) bromide
99%

203149
Copper(II) chloride
99.999% trace metals basis

222011
Copper(II) chloride
97%

467847
Copper(II) chloride dihydrate
≥99.95% trace metals basis

307483
Copper(II) chloride dihydrate
ACS reagent, ≥99.0%

731714
copper(II) ethylacetoacetate
97%

223395
Copper(II) nitrate hemi(pentahydrate)
ACS reagent, 98%

310433
Copper(II) oxide
needles, mixture of CuO and Cu_2O, ACS reagent

241741
Copper(II) oxide
ACS reagent, ≥99.0%

469130
Copper(II) sulfate pentahydrate
99.995% trace metals basis

209198
Copper(II) sulfate pentahydrate
ACS reagent, ≥98.0%

C2284
Copper(II) sulfate solution
4 % (w/v) (prepared from copper (II) sulfate pentahydrate)

61243
Copper(II) tartrate hydrate
≥95.0% (calc. on dry substance, RT)

731722
Copper(II) *tert*-butylacetoacetate
97%

747688
Copper(II) trifluoromethanesulfonimide hydrate

930865
[CpNi(IPr)Cl]
≥95%

593192
Cu-TMEDA catalyst

747629
$Cu(dap)_2$ chloride

931195
CX401
Umicore

725463
CX41
Umicore

725439
CX42
Umicore

225487
Cyclopentadienyl iron(II) dicarbonyl dimer
99%

484369
Cyclopentadienylhafnium(IV) trichloride
97%

117609
Cyclopentadienylmolybdenum(II) tricarbonyl, dimer
98%

234834
Cyclopentadienyltitanium(IV) trichloride
97%

475203
Cyclopentadienylzirconium(IV) trichloride
97%

331708
Dibromobis(triphenylphosphine)nickel(II)
99%

251119
Dicarbonylcyclopentadienyliodoiron(II)
97%

532126
Dichloro[*rac*-ethylenebis(4,5,6,7-tetrahydro-1-indenyl)]zirconium(IV)
97%

393231
Dichloro[*rac*-ethylenebis(indenyl)]zirconium(IV)

362204
Dichloro(1,10-phenanthroline)copper(II)
98%

325287
Dichloro(*N,N,N',N'*-tetramethylethylenediamine)zinc
98%

461822
Dichlorobis(indenyl)titanium(IV)

567671
Dichlorobis(trimethylphosphine)nickel(II)
97%

262676

Dichlorobis(triphenylphosphine)cobalt(II)
98%

692689
Dicyclohexyl(4-(*N*,*N*-dimethylamino)phenyl)phosphine
95%

225460
Diironnonacarbonyl
98%

224308
Dilithium tetrachlorocuprate(II) solution
M in THF

425664
Dysprosium(III) trifluoromethanesulfonate
98%

921750
***endo*-*N*-Methyl-5-norbornene-2-carboxamide**
≥95%

442658
Ethynylferrocene
97%

ALD00386
Fe(dibm)$_3$

F408
Ferrocene
98%

8.03978
Ferrocene
for synthesis

122459
Ferrocenecarboxaldehyde
98%

335061
Ferrocenemethanol
97%

482358
Ferrocenium tetrafluoroborate
technical grade

804371
Fro-DO, mixture of diastereomers
97%

915246
Grubbs catalyst® M203
Umicore

569747
Grubbs Catalyst® M204
Umicore

915742
Grubbs Catalyst® M208
Umicore

923125
Grubbs Catalyst® M801
Umicore

594636
Hafnium(IV) carbide
<1.25 µm particle size

679755
Hexafluorozirconic acid solution
50 wt. % in H_2O

683094
HS157
Umicore, 97%

922773
IPr*Pd(acac)Cl
≥95%

929743
[Ir(df(CF$_3$)ppy)$_2$(4,4'-(OMe)$_2$bpy]BF$_4$
≥95%

925497
[Ir(dFOMeppy)$_2$(dtbbpy)]PF$_6$
≥95%

922897
[Ir(ppy)$_2$(5,5′-Me$_2$bpy)]PF$_6$
≥95%

206245
Iridium(III) chloride hydrate
reagent grade

12310
Iron
≥99%, reduced, powder (fine)

44890
Iron
puriss. p.a., carbonyl-Iron powder, low in magnesium and manganese compounds, ≥99.5% (RT)

209309
Iron
powder, −325 mesh, 97%

481718
Iron(0) pentacarbonyl
>99.99% trace metals basis

195731
Iron(0) pentacarbonyl

400831
Iron(II) bromide
98%

372870
Iron(II) chloride
98%

450944
Iron(II) chloride
AnhydroBeads™, −10 mesh, 99.9% trace metals basis

414913
Iron(II) ethylenediammonium sulfate tetrahydrate
98%

44953
Iron(II) lactate hydrate
≥98.0% (dried material)

215422
Iron(II) sulfate heptahydrate
ACS reagent, ≥99.0%

12354
Iron(II) sulfate heptahydrate
puriss., meets analytical specification of Ph. Eur., BP, USP, FCC, 99.5-104.5% (manganometric)

343161
Iron(II) sulfide
−100 mesh, 99.9% trace metals basis

44920
Iron(III) acetylacetonate
purum, ≥97.0% (RT)

F300
Iron(III) acetylacetonate
97%

517003
Iron(III) acetylacetonate
≥99.9% trace metals basis

217883
Iron(III) bromide
98%

451649
Iron(III) chloride
anhydrous, powder, ≥99.99% trace metals basis

701122
Iron(III) chloride
sublimed grade, ≥99.9% trace metals basis

F2877

Iron(III) chloride hexahydrate
reagent grade, ≥98%, chunks

236489
Iron(III) chloride hexahydrate
ACS reagent, 97%

12322
Iron(III) chloride solution
purum, 45% $FeCl_3$ basis

254223
Iron(III) nitrate nonahydrate
≥99.95% trace metals basis

216828
Iron(III) nitrate nonahydrate
ACS reagent, ≥98%

436011
Iron(III) phosphate dihydrate
Fe 29 %

307718
Iron(III) sulfate hydrate
97%

Z742108
KitAlysis™ 24-well Reaction Block and Inertion Box Combination Starter Set

Z742107
KitAlysis™ 24-well Reaction Block and Screwdriver Set

262072
Lanthanum(III) chloride heptahydrate
ACS reagent

400904
Lithium molybdate
99.9% trace metals basis

245267
Manganese(0) carbonyl
98%

328146
Manganese(II) chloride
beads, 98%

529680
Manganese(II) chloride hydrate
99.999% trace metals basis

13220
Manganese(II) chloride monohydrate
≥97.0%

M2284
Manganese(III) acetylacetonate
technical grade

680265
Mercury(I) nitrate dihydrate
reagent grade, ≥97%

176109
Mercury(II) acetate
ACS reagent, ≥98.0%

10005
Mercury(II) amidochloride
≥95.0%, powder

200085
Mercury(II) bromide
ACS reagent

M1136
Mercury(II) chloride
ReagentPlus®, 99%

215465
Mercury(II) chloride
ACS reagent, ≥99.5%

221090
Mercury(II) iodide
ACS reagent, ≥99.0%

83374
Mercury(II) thiocyanate
purum p.a., ≥95.5% (complexometric)

M4128
Mercury(II) thiocyanate
96.5-103.5% (titration)

736627
Mesitylcopper(I)

412910
Methyltrioxorhenium(VII)
Re 71.0-76.0 %

208353
Molybdenum(V) chloride
95%

M0753
Molybdenum(VI) oxide
ReagentPlus®, ≥99.5%

267856
Molybdenum(VI) oxide
ACS reagent, ≥99.5%

373729
Molybdenum(VI) tetrachloride oxide
97%

577766
Molybdenumhexacarbonyl
≥99.9% trace metals basis

232084
Molybdic acid
≥85.0% MoO_3 basis, ACS reagent

908886
***N*-Cyano-4-methoxy-picolinimidamide**
≥95%

274712
***N*,*N'*-Bis(salicylidene)ethylenediaminocobalt(II)**

99%

930857
$Ni(bpy)Cl_2$

928429
Ni(COD)(CPDO-Ph)
≥95%

912794
Ni(COD)(DQ)
≥95%

930032
Ni(COD)(tBu-BQ)
≥95%

930199
Ni(COD)(TSO-Ph)
≥95%

917745
$[Ni(dtbbpy)(H_2O)_4]Cl_2$

908711
$Ni(IMes)(di\text{-}t\text{-}butyl\ fumarate)_2$

908541
$Ni(IPr^*OMe)(phenyl\ acrylate)_2$

72262
Nickel (IV) oxide
technical, oxidizing agent, ~30% active peroxide basis

544183
Nickel carbonate, basic hydrate
99.9% trace metals basis

244066
Nickel(II) acetate tetrahydrate
98%

72225

Nickel(II) acetate tetrahydrate
purum p.a., ≥99.0% (KT)

283657
Nickel(II) acetylacetonate
95%

776254
Nickel(II) bis(trifluoromethanesulfonimide) hydrate
95%

217891
Nickel(II) bromide
98%

459674
Nickel(II) bromide 2-methoxyethyl ether complex

406341
Nickel(II) bromide ethylene glycol dimethyl ether complex
97%

233730
Nickel(II) bromide hydrate
98%

72243
Nickel(II) bromide trihydrate
98% (AT)

72248
Nickel(II) carbonate basic hydrate
technical, ~46% Ni basis (KT)

696668
Nickel(II) chloride ethylene glycol dimethyl ether complex
98%

339709
Nickel(II) hexafluoroacetylacetonate hydrate
98%

400777
Nickel(II) iodide
powder

244074
Nickel(II) nitrate hexahydrate
crystals

749249
Oxobis(2,2,6,6-tetramethyl-3,5-heptanedionato)titanium(IV)
95%

665096
Oxotrichloro[(dimethylsulfide)triphenylphosphine oxide]rhenium(V)
97%

348694
Palladium
wire, diam. 0.5 mm, 99.9% trace metals basis

674133
Palladium nanoparticles entrapped in aluminum hydroxide matrix
0.5 wt. % loading

908134
Palladium on calcium carbonate
Evonik Noblyst® P8059 5% Pd

520829
Palladium on carbon
extent of labeling: 10 wt. % loading (dry basis), matrix carbon powder, wet support

330116
Palladium on carbon
extent of labeling: 5 wt. % loading (dry basis), matrix activated carbon, wet support, Degussa type E101 NO/W

919608
[Pd(IPr#)(3-CF_3-AN)Cl_2]

919594
Pd(IPr#)(AN)Cl_2
≥95%

919616
[Pd(IPr#)(cin)Cl]

915165
[Pd(IPr)(3-CF_3-AN)Cl_2]
≥95%

922919
Pd(IPr)(acac)Cl

327611
Pentacarbonylchlororhenium(I)
98%

475181
Pentamethylcyclopentadienylzirconium(IV) trichloride
97%

261963
Perrhenic acid solution
75-80 wt. % in H_2O

911828
PhPAd-DalPhos Ni(*o*-tolyl)Cl
≥95%

520799
Platinum black
low bulk density, ≥99.9% trace metals basis

205915
Platinum black
black, powder, ≤20 µm, ≥99.95% trace metals basis

12902
Potassium hexacyanocobaltate(III)
≥97.0%

12639
Potassium hexacyanoferrate(II) trihydrate
purum, ≥99%

P3289
Potassium hexacyanoferrate(II) trihydrate
ACS reagent, 98.5-102.0%

244023
Potassium hexacyanoferrate(III)
ACS reagent, ≥99.0%

14007
Potassium titanium oxide oxalate dihydrate

922641
Pr-DMQA[BF_4]
≥95%

C1900
Protoporphyrin IX cobalt chloride

902047
Pyridine-2,6-bis(carboximidamide) dihydrochloride
≥95%

183687
Reinecke salt
ACS reagent, ≥93.0%

309184
Rhenium(III) chloride

309192
Rhenium(V) chloride

RNI00087
Ritter Iminopyridine Ferrous Chloride Polymerization Catalyst

708674
RuCl[(*S*,*S*)-TsDPEN](mesitylene)
95%

8.14056
Ruthenium(III) acetylacetonate
for synthesis

325899
Scandium(III) acetate hydrate
99.9% trace metals basis

451266
Scandium(III) chloride
anhydrous, powder, 99.99% trace metals basis

409359
Scandium(III) chloride
anhydrous, powder, 99.9% trace metals basis

307858
Scandium(III) chloride hydrate
99.9%

432105
Scandium(III) fluoride
anhydrous, powder, 99.99% trace metals basis

410128
Scandium(III) isopropoxide

307874
Scandium(III) oxide
99.9% trace rare earth metals basis

294020
Scandium(III) oxide
powder, 99.995% trace rare earth metals basis

418218
Scandium(III) triflate
99%

483354
Scandium(III) triflate
99.995% trace metals basis

8.18003
Silver trifluoroacetate
for synthesis

13425

Sodium ferrocyanide decahydrate
≥98.0%

233722
Sodium hexanitrocobaltate(III)
ACS reagent

401307
Sodium metatitanate
−200 mesh

590088
Sodium metavanadate
anhydrous, 99.9% trace metals basis

243655
Sodium molybdate
≥98%

M1651
Sodium molybdate dihydrate
≥99.5%, suitable for plant cell culture

M1003
Sodium molybdate dihydrate
≥99.5%

331058
Sodium molybdate dihydrate
ACS reagent, ≥99%

480967
Sodium molybdate dihydrate
99.99% trace metals basis

228710
Sodium nitroferricyanide(III) dihydrate
ACS reagent, ≥99%

450243
Sodium orthovanadate
99.98% trace metals basis

692360
Sodium tetrakis[3,5-bis(trifluoromethyl)phenyl]borate

931853
SPhos Pd G6 acylation
≥95%

400475
Tantalum(V) chloride
99.99% trace metals basis

218634
Tantalum(V) chloride
99.8% trace metals basis

510688
Tantalum(V) chloride
anhydrous, powder, 99.999% trace metals basis

317004
Tantalum(V) fluoride
98%

900432
Tetra-*n*-butylammonium decatungstate

346276
Tetrakis(acetonitrile)copper(I) hexafluorophosphate
97%

677892
Tetrakis(acetonitrile)copper(I) tetrafluoroborate
97%

725544
Tetrakis(ethylmethylamido)hafnium(IV)
packaged for use in deposition systems

725528
Tetrakis(ethylmethylamido)zirconium(IV)
packaged for use in deposition systems

675202
Tetrakis(hexahydro-2*H*-pyrimido[1,2-*a*]pyrimidinato)ditungsten(III) dichloride

734527
Tetrakis(pyridine)copper(II) triflate

95%

8.14761
Tetrakis(triphenylphosphine)-palladium(0)
for synthesis

244996
Tetrakis(triphenylphosphine)nickel(0)
Ni 4-7 % (approx.)

288063
Tetrakis(triphenylphosphite)nickel(0)

685038
Tetrakisacetonitrile copper(I) triflate

T25305
Tetraphenylarsonium(V) chloride hydrate
97%

917982
Tetrapyridyl nickel (II) dichloride
≥95%

697079
Titanium tetrachloride
packaged for use in deposition systems

209279
Titanium(II) hydride
−325 mesh, 98%

399817
Titanium(III) fluoride

8.43742
Titanium(IV) bis(acetylacetonate) diisopropoxide
(75% solution in 2-propanol) for synthesis

388165
Titanium(IV) bis(ammonium lactato)dihydroxide solution
50 wt. % in H_2O

307793

Titanium(IV) bromide
98%

510718
Titanium(IV) butoxide, polymer

208566
Titanium(IV) chloride
ReagentPlus®, 99.9% trace metals basis

395404
Titanium(IV) chloride tetrahydrofuran complex
97%

494143
Titanium(IV) diisopropoxidebis(2,2,6,6-tetramethyl-3,5-heptanedionate)
99.99%

333239
Titanium(IV) fluoride

330833
Titanium(IV) oxyacetylacetonate
90%

14023
Titanium(IV) oxysulfate
≥29% Ti (as TiO_2) basis, technical

495379
Titanium(IV) oxysulfate solution
~15 wt. % in dilute sulfuric acid, 99.99% trace metals basis

333492
Titanium(IV) sulfide
powder, -200 mesh, 99.9%

446289
Trichloro(pentamethylcyclopentadienyl)titanium(IV)
97%

370193
Trichlorooxobis(triphenylphosphine)rhenium(V)

381411
Triirondodecacarbonyl
contains 1-10% methyl alcohol

674192
Trioxo(triphenylsilyloxy)rhenium(VII)

547980
Tris[*N*,*N*-bis(trimethylsilyl)amide]samarium(III)
98%

524514
Tris[*N*,*N*-bis(trimethylsilyl)amide]yttrium

700223
Tris(2,2,6,6-tetramethyl-3,5-heptanedionato)manganese(III)
97%

524522
Tris(butylcyclopentadienyl)yttrium(III)
99.9% trace metals basis

521280
Tris(diethylamido)(*tert*-butylimido)tantalum(V)
99%, ≥99.99% trace metals basis

260983
Tris(ethylenediamine)cobalt(III) chloride dihydrate

241431
Tungsten hexacarbonyl
97%

472956
Tungsten hexacarbonyl
99.99% trace metals basis (excluding Mo), purified by sublimation

263974
Tungsten(IV) chloride
95%

241911
Tungsten(VI) chloride
≥99.9% trace metals basis

265012
Tungsten(VI) oxychloride
98%

422371
Vanadium(II) chloride
85%

227110
Vanadium(III) acetylacetonate
97%

208272
Vanadium(III) chloride
97%

395382
Vanadium(III) chloride tetrahydrofuran complex (1:3)
97%

8.08505
Vanadium(IV) oxide acetylacetonate
for synthesis

204862
Vanadium(IV) oxide sulfate hydrate
≥99.99% trace metals basis

233706
Vanadium(IV) oxide sulfate hydrate
97%

223794
Vanadium(V) oxide
≥98%

221899
Vanadium(V) oxide
≥99.6% trace metals basis

200891
Vanadium(V) oxychloride
99%

94735
Vanadyl acetylacetonate
purum, ≥97.0% (RT)

283630
Vinylferrocene
97%

901425
White-Clark catalyst

763381
XPhos Pd G3
98%, 1:1 MTBE adduct

326046
Yttrium(III) acetate hydrate
99.9% metals basis

510661
Yttrium(III) butoxide solution
0.5 M in toluene, ≥99.9% trace metals basis

451363
Yttrium(III) chloride
anhydrous, powder, 99.99% trace metals basis

425745
Yttrium(III) trifluoromethanesulfonate
98%

665916
Yttrium(III) tris(isopropoxide)

215481
Zinc
mossy, ≥99%

266353
Zinc
pieces, 2-14 mesh, 99.9% trace metals basis

243469
Zinc
granular, 20-30 mesh, ACS reagent, ≥99.8%

96454
Zinc
purum, powder

31653
Zinc
puriss. p.a., ACS reagent, reag. ISO, reag. Ph. Eur., ≥99.9%, granular

565148
Zinc
granular, 30-100 mesh, 99%

209988
Zinc
dust, <10 µm, ≥98%

383317
Zinc acetate
99.99% trace metals basis

383058
Zinc acetate dihydrate
ACS reagent, ≥98%

96459
Zinc acetate dihydrate
puriss. p.a., ACS reagent, ≥99.0% (KT)

25044
Zinc acetate dihydrate
puriss., E 650, 99-102%

Z0625
Zinc acetate dihydrate
reagent grade

480991
Zinc acetylacetonate hydrate
99.995% trace metals basis

132306
Zinc acetylacetonate hydrate

417696
Zinc bis[bis(trimethylsilyl)amide]
97%

230022
Zinc bromide
99.999% trace metals basis

451398
Zinc bromide
AnhydroBeads™, −10 mesh, 99.999% trace metals basis

229997
Zinc chloride
99.999% trace metals basis

450111
Zinc chloride
AnhydroBeads™, amorphous, −10 mesh, 99.99% trace metals basis

456845
Zinc chloride
AnhydroBeads™, amorphous, −10 mesh, 99.999% trace metals basis

211273
Zinc chloride
ACS reagent, ≥97%

208086
Zinc chloride
reagent grade, ≥98%

746355
Zinc chloride
anhydrous, free-flowing, Redi-Dri™, ACS reagent, ≥97%

720755
Zinc di[bis(trifluoromethylsulfonyl)imide]
95%

329703
Zinc diethyldithiocarbamate
97%

329711

Zinc dimethyldithiocarbamate
97%

466360
Zinc iodide
anhydrous, powder, 99.999% trace metals basis

230014
Zinc iodide
≥99.99% trace metals basis

223883
Zinc iodide
≥98%

587583
Zinc phosphate
99.998% trace metals basis

26423
Zinc stearate
purum, 10-12% Zn basis

221376
Zinc sulfate heptahydrate
ACS reagent, 99%

333271
Zinc sulfide
pieces, 3-12 mm, 99.9% trace metals basis

14459
Zinc sulfide
purum, 97% (from Zn)

244627
Zinc sulfide
powder, 10 µm, 99.99% trace metals basis

333875
Zinc tetrafluoroborate hydrate

290068
Zinc trifluoromethanesulfonate
98%

8.08803
Zinc(II) acetylacetonate
for synthesis

CDS000589
Zinc(II) dibutyldithiocarbamate
Aldrich^{CPR}

208558
Zirconium(II) hydride
−325 mesh, 99%

338001
Zirconium(IV) acetylacetonate
97%

8.08915
Zirconium(IV) acetylacetonate
for synthesis

14616
Zirconium(IV) carbonate basic
≥40% ZrO_2 basis

357405
Zirconium(IV) chloride
≥99.9% trace metals basis

221880
Zirconium(IV) chloride
≥99.5% trace metals basis

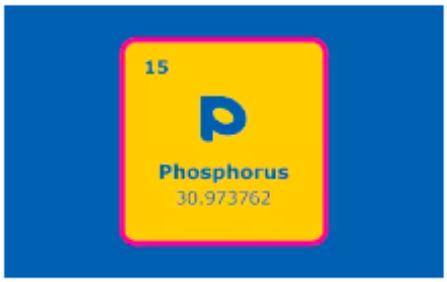
647640
Zirconium(IV) chloride
anhydrous, powder, 99.99% trace metals basis

395420
Zirconium(IV) chloride tetrahydrofuran complex (1:2)
99%

311464
Zirconium(IV) fluoride
99.9% trace metals basis

464236
Zirconium(IV) hydrogenphosphate

Phosphine Ligands



Phosphine ligands are the most significant class of ligands for cross-coupling because of the alterability of their electronic and steric properties. Ligands play a key role in stabilizing and activating the central metal atom and are used in reactions, such as transition metal catalyzed cross-coupling. Research has focused on the development of more effective ligands to improve catalyst performance. We offer an unprecedented portfolio of monodentate phosphine ligands and precursors, bidentate phosphine ligands and precursors, chiral ligands, Buchwald ligands, cataCXium® ligands, and DalPhos Ligands.

MONODENTATE PHOSPHINE LIGANDS AND PRECURSORS

Monodentate phosphine ligands are compounds with only one phosphine atom available to interact with the metal. These ligands are not difficult to synthesize and allow for easy modifications. The flexibility of monophosphines allows for usage in reactions where certain activities or selectivities may be difficult to accomplish. We offer a wide variety of ligand motifs, including central chirality on the phosphorous atom, biaryl axial chirality, and planar chirality, to meet your research needs.

BIDENTATE PHOSPHINE LIGANDS AND PRECURSORS

Bidentate phosphine ligands and precursors, also called diphosphines, are identified by the ligand having two phosphine atoms present connected by a side chain. Typically, this side chain is between two to four carbons long and forms an A-frame complex with the metal. Many bidenatate phoshine ligands and precursors have been designed to introduce a chiral ligand during synthesis. These ligands are very stable and able to form highly active and selective systems that allow for desired synthesis where other ligands have failed.

BUCHWALD LIGANDS

Buchwald ligands are bulky electron-rich dialkylbiaryl phospines and are known to improve reactivity in palladium catalysis. The structure of the ligand directly correlates to the efficiency of the catalysts contained in the ligand. The Buchwald group has continued to develop and modify these ligands, leading to the creation of ligands that are tailored to specific transformations.

CATACXIUM® LIGANDS

cataCXium® Ligands are highly effective ligands for palladium catalyzed cross-coupling reactions. Di-adamantylalkylphosphine, known as cataCXium® A, is a bulky and electron-rich phosphine ligand used for Heck and Suzuki couplings, Buchwald-Hartwig amination of arylchlorides, and a-arylation reactions of ketones. In reactions, these ligands allow for low catalyst loadings used under mild conditions. Recently, another class of basic, sterically-hindered phosphines featuring phosphino-substituted N-aryl pyrroles (cataCXium® P) has shown high catalyst turnover numbers for the Suzuki coupling of both electron-rich and electron-deficient aryl chlorides.

DALPHOS LIGANDS

The bulky di(1-adamantyl)phosphino [P(1-Ad)$_2$] fragment is common to the DalPhos ligand scaffold. These chelating N,P ligands are useful for Pd-catalyzed C–N and C–C bond formation. The more reactive Mor-DalPhos improves the scope and utility of ammonia coupling at room temperature and is also effective in coupling of hydrazine and acetone.

926094
(*R*)-RUCY™-XylBINAP
Takasago

926140
(*S*,*S*)-Ms-DENEB™

926124
(*S*,*S*)-Ts-DENEB™

926108
(*S*)-RUCY™-XylBINAP
Takasago

716634
(1*R*,2*R*)-*N*,*N*'-Bis[2-(diphenylphosphino)benzyl]cyclohexane-1,2-diamine
95%

739006
(2-Bromophenyl)dicyclohexylphosphine
97%

698482
(2-Bromophenyl)diphenylphosphine
97%

912956
(2*R*,2'*R*,3*R*,3'*R*)-MeO-BIBOP

912727
(2*R*,3*R*)-iPr-BIDIME

567728
(4-Hydroxyphenyl)diphenylphosphine
98%

905283
(6-Aminohexyl)triphenylphosphonium bromide hydrobromide
≥95%

510017
(Oxydi-2,1-phenylene)bis(diphenylphosphine)
98%

905240
(*R*,*R*,*R*)-SPIRAP
≥95%

DPM00008
(*R*,*R*)-Bis-(4-dimethylaminophenyl)ethylenediamine tetrahydrochloride

905542
(*R*,*R*)-SINpEt·HBF$_4$
≥95%

761419
(*R*)-(4,4',6,6'-Tetramethoxybiphenyl-2,2'-diyl)bis(bis(3,5-di-*tert*-butyl-4-methoxyphenyl)phosphine
97%

761389
(R)-(4,4',6,6'-Tetramethoxybiphenyl-2,2'-diyl)bis(bis(3,5-dimethylphenyl)phosphine)
97%

913456
(*R*)-AntPhos
≥97%

913200
(*R*)-BIDIME
≥97%

T511579
(*R*)-C8-TCYP
Aldrich[CPR]

700754
(*R*)-SDP

761400
(*S*)-(4,4′,6,6′-Tetramethoxybiphenyl-2,2′-diyl)bis(bis(3,5-di-*tert*-butyl-4-methoxyphenyl)phosphine
97%

748277
(*S*)-1-(Diphenylphosphino)-3-methyl-2-butylamine
97%

748307
(*S*)-1-(Diphenylphosphino)-3,3-dimethylbutan-2-amine
97%

912476
(*S*)-AntPhos
≥97%

912719
(*S*)-BIDIME
≥97%

T511609
(*S*)-TCYP
Aldrich[CPR]

700851
(*S*)-Xyl-SDP

900275
(t-Bu)PhCPhos
95%

555142
1-Diphenylphosphino-1′-(di-*tert*-butylphosphino)ferrocene

708933
1,1'-Bis(dicyclohexylphosphino)ferrocene
97%

578266
1,1'-Bis(diisopropylphosphino)ferrocene
97%

567159
1,1'-Bis(phenylphosphinidene)ferrocene
97%

555088
1,1'-Bis(phenylphosphino)ferrocene
97%

380741
1,1,1-Tris(diphenylphosphinomethyl)ethane

631922
1,2-Bis(di-*tert*-butylphosphinomethyl)benzene

261920
1,2-Bis(dichlorophosphino)ethane
97%

479500
1,2-Bis(dicyclohexylphosphino)ethane

261939
1,2-Bis(dimethylphosphino)ethane
97%

460273
1,2-Bis(diphenylphosphino)benzene
97%

675784
1,2,3,4,5-Pentaphenyl-1'-(di-*tert*-butylphosphino)ferrocene

440418
1,3-Bis(dicyclohexylphosphino)propane
95%

262048
1,3-Bis(diphenylphosphino)propane
97%

695467
1,3,5-Triaza-7-phosphaadamantane
97%

695459
1,3,5,7-Tetramethyl-6-phenyl-2,4,8-trioxa-6-phosphaadamantane
97%

440426
1,4-Bis(dicyclohexylphosphino)butane

261947
1,4-Bis(diphenylphosphino)butane
98%

287997
1,5-Bis(diphenylphosphino)pentane
97%

287989
1,6-Bis(diphenylphosphino)hexane
97%

752231
2-[2-(Dicyclohexylphosphino)phenyl]-*N*-methylindole
97%

701920
2-((Di-*tert*-butylphosphinomethyl)-6-diethylaminomethyl)pyridine

695599
2-(2-(Diphenylphosphino)ethyl)pyridine
kanata purity

716626
2-(Di-*p*-tolylphosphino)benzaldehyde
97%

672661
2-(Di-*tert*-butyl-phosphino)-1-phenyl-1*H*-pyrrole
95%

672564
2-(Di-*tert*-butylphosphino)-1-(2-methoxyphenyl)-1*H*-pyrrole
95%

672343
2-(Di-*tert*-butylphosphino)-1-phenylindole
95%

672017
2-(Dicyclohexylphosphino)-1-phenyl-1*H*-pyrrole
95%

326208
2-(Diphenylphosphino)benzaldehyde
97%

43162
2-(Diphenylphosphino)ethylamine
≥95.0% (GC)

324124
2-Chloro-1,3,2-benzodioxaphosphorin-4-one
95%

675784
1,2,3,4,5-Pentaphenyl-1′-(di-*tert*-butylphosphino)ferrocene

440418
1,3-Bis(dicyclohexylphosphino)propane
95%

262048
1,3-Bis(diphenylphosphino)propane
97%

695467
1,3,5-Triaza-7-phosphaadamantane
97%

695459
1,3,5,7-Tetramethyl-6-phenyl-2,4,8-trioxa-6-phosphaadamantane
97%

440426

1,4-Bis(dicyclohexylphosphino)butane

261947
1,4-Bis(diphenylphosphino)butane
98%

287997
1,5-Bis(diphenylphosphino)pentane
97%

287989
1,6-Bis(diphenylphosphino)hexane
97%

752231
2-[2-(Dicyclohexylphosphino)phenyl]-*N*-methylindole
97%

701920
2-((Di-*tert*-butylphosphinomethyl)-6-diethylaminomethyl)pyridine

695599
2-(2-(Diphenylphosphino)ethyl)pyridine
kanata purity

716626
2-(Di-*p*-tolylphosphino)benzaldehyde
97%

672661
2-(Di-*tert*-butyl-phosphino)-1-phenyl-1*H*-pyrrole
95%

672564
2-(Di-*tert*-butylphosphino)-1-(2-methoxyphenyl)-1*H*-pyrrole
95%

672343
2-(Di-*tert*-butylphosphino)-1-phenylindole
95%

672017
2-(Dicyclohexylphosphino)-1-phenyl-1*H*-pyrrole
95%

326208
2-(Diphenylphosphino)benzaldehyde
97%

43162
2-(Diphenylphosphino)ethylamine
≥95.0% (GC)

324124
2-Chloro-1,3,2-benzodioxaphosphorin-4-one
95%

736589
2,6-Bis(di-*tert*-butylphosphinomethyl)pyridine

43163
3-(Diphenylphosphino)-1-propylamine
technical, ≥90% (GC)

747270
4-(Diethylphosphino)-N,N-dimethylaniline
97%

395021
4-(Dimethylamino)phenyldiphenylphosphine
95%

401595
4-(Diphenylphosphino)benzoic acid
97%

708127
4-(Diphenylphosphino)styrene
97%

676632
***5*-(Di-*tert*-butylphosphino)-1′, 3′, *5*′-triphenyl-1′*H*-[1,4′]bipyrazole**
97%

710598
5-(Di-*tert*-butylphosphino)-1-(naphthalen-1-yl)-1*H*-pyrazole
97%

738611
5-(Dicyclohexylphosphino)-1′,3′,*5*′-triphenyl-1′*H*-[1,4′]bipyrazole

97%

699535
6,6′-[(3,3′-Di-*tert*-butyl-5,5′-dimethoxy-1,1′-biphenyl-2,2′-diyl)bis(oxy)]bis(dibenzo[*d*,*f*][1,3,2]dioxaphosphepin)
97%

667196
9,9-Dimethyl-4,5-bis(di-*tert*-butylphosphino)xanthene
97%

768154
AdBrettPhos
95%

900278
AdCyBrettPhos

919004
AliPhos
≥95%

336874
Allyldiphenylphosphine
95%

799718
AlPhos

918997
AndrewPhos
≥95%

677264
APhos
95%

487546
Benzyldiphenylphosphine
≥95%

259101
Bis(2-diphenylphosphinoethyl)phenylphosphine
97%
710466

Bis(2-methoxyphenyl)phosphine
97%

900277
Bis(3,5-bis(trifluoromethyl)phenyl)(2′,6′-bis(dimethylamino)-3,6-dimethoxybiphenyl-2-yl)phosphine
≥95%

694673
Bis(3,5-di-*tert*-butyl-4-methoxyphenyl)phosphine

695157
Bis(3,5-dimethylphenyl)phosphine

451053
Bis(dichlorophosphino)methane
95%

436437
Bis(dicyclohexylphosphino)methane
95%

592684
Bis(dimethylphosphino)methane
97%

287954
Bis(diphenylphosphino)acetylene
98%

127566
Bis(diphenylphosphino)methane
97%

718742
BrettPhos
98%

671479
cataCXium® A
95%

928917
[CF_3]$_8$-DPPF
≥95%

698776
Chloro(*tert*-butyl)phenylphosphine

686697
Chlorodi(*o*-tolyl)phosphine

481408
Chlorodicyclohexylphosphine
97%

337773
Chlorodiisopropylphosphine
96%

327646
***cis*-1,2-Bis(diphenylphosphino)ethylene**
97%

759171
CPhos
98%

698245
Cyclohexyldichlorophosphine
95%

510742
Cyclohexyldiphenylphosphine

638099
CyJohnPhos
97%

RNI00049
CyJohnPhos HBF4
Aldrich^{CPR}

923478
CyMPhos

910732
CyPAd-DalPhos
≥95%

638021
DavePhos
97%

695823
Di-1-adamantylphosphine
97%

301558
Di-*tert*-butylchlorophosphine
96%

642629
Di-*tert*-butylmethylphosphine
97%

751413
Di(1-adamantyl)-2-dimethylaminophenylphosphine
98%

671800
Di(1-adamantyl)benzylphosphine
95%

737267
Di(1-adamantyl)chlorophosphine
97%

692689
Dicyclohexyl(4-(*N*,*N*-dimethylamino)phenyl)phosphine
95%

288284
Dicyclohexylphenylphosphine
95%

381241

Diethylphenylphosphine
96%

265020
Dimethylphenylphosphine
99%

392960
Diphenyl-2-pyridylphosphine
97%

155039
Diphenyl(*p*-tolyl)phosphine
96%

392073
Diphenyl(trimethylsilyl)phosphine
technical grade

252964
Diphenylphosphine
98%

287881
Diphenylphosphine oxide
97%

479799
Divinylphenylphosphine

177261
DPPF
97%

695149
DTBPF

901215
Ephos
≥95%

336904
Ethyldiphenylphosphine
98%

376728
Ethylenebis(diphenylphosphine)
99%

106496
Ethylenebis(diphenylphosphine)
97%

902292
EvanPhos
≥95%

L512389
Exo-Phenyl Kwon [2.2.1] Bicyclic Phosphine

918008
GPhos
≥95%

799580
HandaPhos
≥95%

917990
Hexahydro-1,3-bis(4-methylphenyl)-5-phenyl-1,3,5-diazaphosphorine
≥95%

336920
Isopropyldiphenylphosphine
97%

731013
JackiePhos
95%

638439
JohnPhos
97%

912042
joYPhos™
Umicore

913294
keYPhos™

792470
Me_3(OMe)tBuXPhos
96% (HPLC)

675938
Me4tButylXphos
96%

695262
MePhos
97%

244902
Methyldiphenylphosphine
99%

751618
MorDalphos
97%

666564
***N*-XantPhos**
97%

766054
***P*-Chlorodiphenylphosphine**
99%

D71984
***P*,*P*-Dichlorophenylphosphine**
97%

900593
PAd-DalPhos
95%

919551
PAd2-DalPhos
≥95%

695882
PhDave-Phos
97%

923443
PhMPhos

910724
PhPAd-DalPhos
≥95%

532649
Poly(ethylene glycol) triphenylphosphine

481084
rac-BINAP
97%

791016
RockPhos
97%

663131
RuPhos
98%

901907
RuPhos
95%

901906
SPhos
95%

638072
SPhos
98%

677280
sSPhos

918989
SummerPhos
≥95%

695874
***t*-BuDavePhos**

730998
tBuBrettPhos
97%

695211
tBuMePhos

901904
***t*BuXPhos**
95%

638080
***t*BuXPhos**
98%

RNI00040
tBuXPhos HBF_4
Aldrich^{CPR}

591688
***tert*-Butyldiphenylphosphine**
97%

287970
***trans*-1,2-Bis(diphenylphosphino)ethylene**
97%

667218
Tri-1-naphthylphosphine
97%

T49484
Tri-*n*-butylphosphine
97%

731374
Tri-*n*-butylphosphine
99%

570958
Tri-*tert*-butylphosphine
98%

383767
Tri(2-furyl)phosphine
99%

8.41817
Tri(o-tolyl)-phosphine
for synthesis

287822
Tri(*o*-tolyl)phosphine
97%

287830
Tri(*p*-tolyl)phosphine
98%

90827
Tributylphosphine
≥93.5% (Tri-*N*-butylphosphine, GC)

247049
Tributylphosphine
mixture of isomers, 97%

261971
Tricyclohexylphosphine

245275
Triethylphosphine
99%

323322
Trimethylphosphine
97%

718165
Trioctylphosphine
97%

117854
Trioctylphosphine
technical grade, 90%

223301
Trioctylphosphine oxide
ReagentPlus®, 99%

93092
Triphenylphosphine
≥95.0% (GC)

T84409
Triphenylphosphine
ReagentPlus®, 99%

336971
Tripropylphosphine
97%

327697
Tris[2-(diphenylphosphino)ethyl]phosphine
97%

775444
Tris(1-pyrrolidinyl)phosphine
97%

392081
Tris(2,4,6-trimethoxyphenyl)phosphine

395080
Tris(2,4,6-trimethylphenyl)phosphine
97%

698253
Tris(3,5-dimethylphenyl)phosphine
96%

249491
Tris(4-chlorophenyl)phosphine
95%

395099
Tris(4-fluorophenyl)phosphine
98%

698261
Tris(4-methoxy-3,5-dimethylphenyl)phosphine
97%

395102
Tris(4-methoxyphenyl)phosphine
95%

666629
Tris(4-trifluoromethylphenyl)phosphine
97%

253189
Tris(diethylamino)phosphine

97%

393290
Tris(dimethylamino)phosphine
97%

177881
Tris(hydroxymethyl)phosphine
90%

290572
Tris(pentafluorophenyl)phosphine
97%
333670
Tris(trimethylsilyl)phosphine
95%

710342
TrixiePhos
97%

913030
trYPhos™
Umicore

902284
TyrannoPhos

711179
vBRIDP
97%

918970
VincePhos
≥95%

900331
VPhos
95%

526460
Xantphos
97%

638064
XPhos
98%

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