Алматы (7273)495-231
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Астрахань (8512)99-46-04
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Брянск (4832)59-03-52
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Владимир (4922)49-43-18
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Кострома (4942)77-07-48
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Ноябрьск (3496)41-32-12
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Сыктывкар (8212)25-95-17
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Тверь (4822)63-31-35
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Ульяновск (8422)24-23-59
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Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
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Россия +7(495)268-04-70 **Казахстан** +7(7172)727-132 **Киргизия** +996(312)96-26-47

www.sigmaaldrich.nt-rt.ru | | scx@nt-rt.ru

Технические характеристики на бороновые кислоты и производные, связывающие реагенты и нуклеозиды, реагенты Гриньяра компании Sigma-Aldrich

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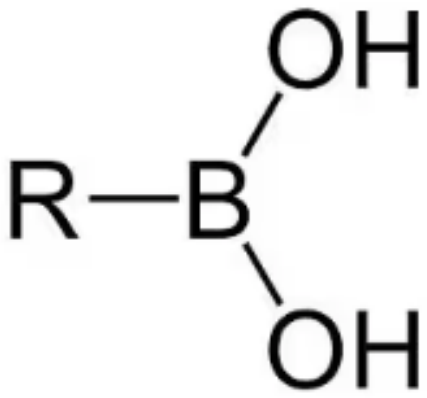
Boronic Acids & Derivatives



Boronic acids and boronic acid derivatives are important in organic synthesis and medicinal chemistry because of their versatility as synthetic intermediates in the preparation of complex molecules. We are pleased to provide a comprehensive portfolio of boronic acids for use in reactions, such as the powerful carbon-carbon bond-forming Suzuki–Miyaura palladium catalyzed cross-coupling reaction, the Stille coupling, Sonogashira coupling, Chan–Lam coupling, Lieberskind–Strogl coupling, conjugate additions, homologations, and electrophilic allyl shifts.

Boronic acids are also used in biological applications, for example for the inhibition of serine proteases. The Raines group has conducted profound research on pendant boronic acids enhancing the cytosolic delivery of a protein toxin, by forming boronate esters with the 1,2- and 1,3-diols of saccharides, such as those that coat the surface of mammalian cells.

Read more about:

Alkenyl and Alkyl Acids

Aryl Boronic Acids

Heteroaryl Boronic Acids

Boronate Esters

Borylation Reagents

MIDA Boronates

Trifluoroburate Salts

ALKENYL AND ALKYL ACIDS

Alkenyl and alkyl acids are substituted boric acids with a carbon-boron bond, denoted by R–$B(OH)_2$. These Lewis acids are “green” compounds due to their low inherent toxicity and rapid environmental degradation. We offer high-quality alkyl and alkenyl acids for boronic acid derivative formation and other chemical synthesis applications.

ARYL BORONIC ACIDS

Most aryl boronic acids readily undergo dehydration reactions to give a cyclic (trimer) anhydride. Our selection of aryl boronic acids may contain varying amounts of this cyclic anhydride. Fortunately, the acid and the anhydride work equally well in Suzuki coupling reactions. Therefore, the two forms are generally regarded as equivalent. We offer a broad portfolio of aryl boronic acids, such as unsubstituted aryl boronic acids, monosubstituted aryl boronic acids, disubstituted aryl boronic acids, trisubstituted aryl boronic acids, tetrasubstituted boronic acids, and penta-substituted aryl boronic acids.

HETEROARYL BORONIC ACIDS

Heteroaryl boronic acids are a synthetic intermediate commonly used in the Suzuki–Miyaura palladium catalyzed cross-coupling reaction and other reactions. These building blocks are heterocyclic and aromatic. They are also used in Chan–Lam coupling, homologations, conjugate additions, electrophilic allyl shifts, Lieberskind–Strogl coupling, Sonogashira coupling, and Stille coupling.

BORONATE ESTERS

A prominent feature of boronic acids is their reversible formation of esters with diols in aqueous solution. Boronate esters are air- and chromatography-stable and suitable for spectroscopic study. The Suzuki–Miyaura cross-coupling reaction can be used with boronate esters. An underlying problem, however, involves reaction scheme incompatibilities between most synthetic reagents. Boronic ester counterparts are often employed to counteract this incompatibility and are more compatible with many synthetic schemes, although liberation of the boronic acid requires harsh conditions that interfere with the synthetic substrates.

N-Methyliminodiacetic acid (MIDA)-protected boronate esters are a new class of reagents that offer great promise in iterative Suzuki–Miyaura cross-coupling reactions. Compared to earlier reagents, MIDA esters are easily handled, unreactive under anhydrous cross-coupling conditions, are benchtop-stable indefinitely under air, and can be deprotected easily using mild aqueous basic conditions. The success of this new class of reagents is tied to their unique molecular architectures. Compared to the simpler B–N-containing molecules ammonia borane and trimethylamine borane, MIDA esters are much larger, and the sp^3 hybridized boron atom is secured by two five membered rings, dramatically increasing the stability of the boronic acid and allowing for the synthesis of complex molecules to take place.

Chiral α-aminoboronate esters, compounds having a tremendous scope of applications in pharmacology, can be synthesized via metal-free nucleophilic boryl addition to tosylaldimines. Boronate esters are utilized in organic electronic devices.

BORYLATION REAGENTS

The Miyaura borylation reaction is a powerful tool for the synthesis of boronates via cross-coupling of borylation reagents with aryl and vinyl halides. Borylated products can easily be purified by chromatographic techniques and are air stable. Strong activation of the product may initiate the competing Suzuki coupling. Therefore, choosing an appropriate base is crucial for the success of the borylation reaction.

Most commonly, lithium or Grignard reagents are used in combination with an electrophilic source of boron to create C–B bonds. However, due to the highly nucleophilic and basic nature of the metal species in this two-step procedure, various functional groups are not well tolerated. The mild reaction conditions of the borylation reaction allow for the preparation of boronates which are not accessible via lithium or Grignard intermediates.

MIDA BORONATES

MIDA boronates represent a class of caged boronic acids and have proven exceptionally successful in iterative Suzuki–Miyaura cross-couplings. These boronic acid surrogates attenuate the transmetallation between the boronic acid and palladium species. However, deprotection is readily achieved at room temperature under mild aqueous basic conditions using either 1M NaOH, or even $NaHCO_3$. Additionally, the MIDA boronates are remarkably robust when treated with various common harsh reagents (e.g. Jones Reagent) to transform the derivative with the MIDA component intact.

TRIFLUOROBURATE SALTS

Potassium trifluoroborate salts ($R\text{-}BF_3K$) are a versatile class of reagents and are effective surrogates to the extensively used organoborane reagents. The stability of trifluoroborate salts not only renders them suitable for extended storage, but their stoichiometry is easy to characterize, since they do not readily undergo trimerization, as happens with their boronic acid counterparts. Trifluoroborate salts are extensively employed in C–C bond formations (e.g., Suzuki–Miyaura cross-couplings) and are also stable under oxidative conditions and metal-halogen exchange, making them “protected boronic acids” in certain reaction media.

346225
(2-Methylpropyl)boronic acid
≥95.0%

723517
(4-Methylphenylboronic acid pinacol ester)triphenylphosphonium bromide
95%

683434
(Dimethylphenylsilyl)boronic acid pinacol ester
95%

710210
(*E*)-3-(*tert*-Butyldimethylsilyloxy)propene-1-yl-boronic acid pinacol ester
97%

706213
1-(2-Morpholinoethyl)-1*H*-pyrazole-4-boronic acid pinacol ester
97%

683566
1-(Ethoxycarbonylmethyl)-1*H*-pyrazole-4-boronic acid pinacol ester
97%

563870
1-(Phenylsulfonyl)-3-indolylboronic acid
97%

654280
1-(Phenylsulfonyl)-3-indolylboronic acid pinacol ester
97%

704776
1-(Thiophen-2-ylmethyl)-1*H*-pyrazole-4-boronic acid pinacol ester
97%

683779
1-Boc-3,5-dimethylpyrazole-4-boronic acid pinacol ester
97%

632732
1-Boc-pyrazole-4-boronic acid pinacol ester
97%

650277
1-Cyclohexen-1-yl-boronic acid pinacol ester

706205
1-Ethyl-1*H*-pyrazole-4-boronic acid pinacol ester
97%

716243
1-Isopropyl-1*H*-pyrazole-4-boronic acid pinacol ester
97%

721344
1-Methyl-1,2,3,6-tetrahydropyridine-4-boronic acid pinacol ester
97%

698628
1-Methyl-1*H*-pyrazole-5-boronic acid pinacol ester
97%

900995
1-Methyl-3-trifluoromethyl-1*H*-pyrazole-4-boronic acid pinacol ester
≥97%

640395
1-Methylindole-5-boronic acid pinacol ester
97%

595314
1-Methylpyrazole-4-boronic acid pinacol ester
95%

571350
1-Phenylvinylboronic acid
95%

512214
1-Thianthrenylboronic acid
≥95%

900989
1,3,5-Phenyltriboronic acid, tris(pinacol) ester
≥97%

663816
1,4-Benzenediboronic acid bis(pinacol) ester
97%

635995
1,4-Benzodioxane-6-boronic acid
≥95%

595756
10-Bromoanthracene-9-boronic acid

708879
1*H*-Benzimidazole-5-boronic acid pinacol ester
97%

715557
1*H*-Benzo[*d*][1,2,3]triazol-5-ylboronic acid pinacol ester
97%

724017
1*H*-Indazole-5-boronic acid
≥95%

762695
1*H*-Indene-2-boronic acid

706256
1*H*-Pyrazole-4-boronic acid
≥95.0%

676659
2-((*tert*-Butyldimethylsilanyl)ethynyl) boronic acid pinacol ester
97%

654361
2-(1-Piperazinyl)pyridine-4-boronic acid pinacol ester
97%

679453
2-(Bromomethyl)phenylboronic acid

682071
2-(Hydroxymethyl)phenylboronic acid cyclic monoester
97%

521248
2-(Methylthio)phenylboronic acid
≥95%

715395
2-(Tetrazol-5-yl)phenylboronic acid
≥95%

D9754
2-Aminoethyl diphenylborinate
97%

8.41636
2-Aminoethyldiphenyl borate
for synthesis

721379
2-Aminophenylboronic acid hydrochloride
≥95%

576557
2-Aminophenylboronic acid pinacol ester
≥95%

900994
2-Aminopyridine-4-boronic acid, pinacol ester
≥97%

640379
2-Aminopyridine-5-boronic acid pinacol ester
97%

706221
2-Aminopyrimidine-5-boronic acid
≥95.0%

499943
2-Benzofuranylboronic acid
≥95%

304166
2-Bromo-1,3,2-benzodioxaborole
97%

719455
2-Bromomethylphenylboronic acid MIDA ester

716235
2-Bromomethylphenylboronic acid pinacol ester
95%

473804
2-Bromophenylboronic acid
≥95.0%

704784
2-Carboxyphenylboronic acid dihydrate

666513
2-Chloro-4-pyridinylboronic acid
≥95.0%

445215
2-Chlorophenylboronic acid
≥95.0%

521396
2-Cyanophenylboronic acid
≥95.0%

683833
2-Ethoxycarbonylphenylboronic acid
≥95%

657344
2-Fluoro-4-formylphenylboronic acid
≥95.0%

445223
2-Fluorophenylboronic acid
≥95%

431958
2-Formylphenylboronic acid
≥95.0%

683817
2-Formylphenylboronic acid pinacol ester
97%

464910
2-Furanylboronic acid
≥95.0%

522554
2-Hydroxyphenylboronic acid pinacol ester
98%

707899
2-Iodophenylboronic acid
≥95%

417149
2-Isopropoxy-4,4,5,5-tetramethyl-1,3,2-dioxaborolane
98%

684589
2-Methoxy-3-pyridinylboronic acid
≥95.0%

673943
2-Methoxy-4,4,5,5-tetramethyl-1,3,2-dioxaborolane
96%

683809
2-Methoxycarbonylphenylboronic acid
≥95.0%

445231
2-Methoxyphenylboronic acid
95%

686875
2-Methyl-1-propenylboronic acid pinacol ester
97%

720836
2-Methyl-2*H*-indazole-6-boronic acid

685194
2-Methyl-4-cyanophenylboronic acid
≥95%

705039
2-Morpholinopyridine-3-boronic acid

480134
2-Naphthylboronic acid
≥95.0%

674958
2-Nitro-5-pyridineboronic acid pinacol ester
97%

436836
2-Thienylboronic acid
≥95.0%

901464
2,2′-Bi-1,3,2-dioxaborinane
≥95%

645141
2,2′:5′,2″-Terthiophene-5-boronic acid pinacol ester
96%

716251
2,2,6,6-Tetramethyl-1,2,3,6-tetrahydro-4-pyridineboronic acid pinacol ester
97%

698571
2,3-Dihydro-5-furylboronic acid pinacol ester
97%

557730
2,3-Dimethoxyphenylboronic acid
97%

521388
2,4-Dichlorophenylboronic acid
≥95%

666491
2,4-Dimethoxy-5-pyrimidinylboronic acid
90%

483486
2,4-Dimethoxyphenylboronic acid
95%

542318
2,4,6-Trimethylphenylboronic acid
≥95%

470317
2,5-Thiophenediylbisboronic acid
≥95.0%

470791
2,6-Difluorophenylboronic acid
98%

706086
2,6-Dimethoxy-3-pyridineboronic acid
≥95%

480096
2,6-Dimethoxyphenylboronic acid
≥97%

480061
2,6-Dimethylphenylboronic acid
≥95.0%

526339
3-(Benzyloxy)phenylboronic acid
≥95%

679445
3-(Bromomethyl)phenylboronic acid
90%

512834
3-(Hydroxymethyl)phenylboronic acid
≥95%

578851
3-(*N*-Boc-amino)phenylboronic acid
≥95%

715441
3-(Trifluoromethyl)-1*H*-pyrazole-4-boronic acid pinacol ester
97%

432032
3-(Trifluoromethyl)phenylboronic acid
≥95%

566012
3-Acetamidophenylboronic acid
≥95%

470813
3-Acetylphenylboronic acid
≥95%

741205
3-aminomethylphenylboronic acid, pinacol ester hydrochloride
97%

900988
3-Aminophenylboronic acid

A71751
3-Aminophenylboronic acid hemisulfate salt
≥95%

410705
3-Aminophenylboronic acid hydrochloride
98%

287512
3-Aminophenylboronic acid monohydrate
98%

574686
3-Aminophenylboronic acid pinacol ester
97%

441627
3-Bromophenylboronic acid
≥95%

721042
3-Carboxy-5-nitrophenylboronic acid

456764
3-Carboxyphenylboronic acid
≥95%

574694
3-Carboxyphenylboronic acid pinacol ester
97%

417521
3-Chlorophenylboronic acid
≥95%

513016
3-Cyanophenylboronic acid
≥95.0%

578401
3-Cyanophenylboronic acid pinacol ester
97%

574651
3-Ethoxycarbonylphenylboronic acid
≥95%

709832
3-Fluoro-2-formylphenylboronic acid
≥95%

704555
3-Fluoro-4-pyridineboronic acid pinacol ester
95%

441643
3-Fluorophenylboronic acid
≥95.0%

666742
3-Formyl-4-isopropoxyphenylboronic acid
≥95%

512869
3-Formyl-4-methoxyphenylboronic acid
≥95%

441651
3-Formylphenylboronic acid
≥95%

512168
3-Furanylboronic acid
≥95.0%

697400
3-Hexylthiophene-2-boronic acid pinacol ester
95%

523968
3-Hydroxyphenylboronic acid
≥95.0%

522562
3-Hydroxyphenylboronic acid pinacol ester
97%

441678
3-Iodophenylboronic acid
≥95%

717665
3-Methoxy-4-pyridineboronic acid pinacol ester
97%

591130
3-Methoxycarbonylphenylboronic acid

441686
3-Methoxyphenylboronic acid

739995
3-Methoxyphenylboronic acid pinacol ester

706078
3-Methyl-1*H*-pyrazole-4-boronic acid pinacol ester
95%

639079
3-Methyl-2-buten-2-ylboronic acid

688290
3-Methyl-2-buten-2-ylboronic acid pinacol ester
95%

696528
3-Methyl-2-butenylboronic acid pinacol ester
96%

325104
3-Nitrophenylboronic acid
≥97%

642622

3-Pyridineboronic acid neopentylglycol ester
97%

576565
3-Pyridineboronic acid pinacol ester
97%

512125
3-Pyridinylboronic acid
≥95.0%

436844
3-Thienylboronic acid
≥95.0%

471917
3,4-Dichlorophenylboronic acid
≥95%

731595
3,4-Dihydro-2*H*-pyran-6-boronic acid pinacol ester

480118
3,4-Dimethoxyphenylboronic acid
≥95.0%

471070
3,5-Bis(trifluoromethyl)phenylboronic acid
≥95%

499501
3,5-Dibromophenylboronic acid
≥95%

471925
3,5-Difluorophenylboronic acid
≥95%

715271
3,5-Dimethoxyphenylboronic acid
≥95%

720410
3,5-Dimethylisoxazol-4-yl-4-boronic acid
≥95%

643882
3,5-Dimethylisoxazole-4-boronic acid pinacol ester

97%

636010
3,5-Dimethylpyrazole-4-boronic acid pinacol ester
97%

721352
3,6-Dihydro-2*H*-pyran-4-boronic acid pinacol ester
97%

706140
4-[(Phenylamino)carbonyl]phenylboronic acid pinacol ester
97%

741469
4-(1*H*Tetrazol-5-yl)phenylboronic acid

721441
4-(4-Boc-piperazinemethyl)phenylboronic acid pinacol ester
95%

741213
4-(Aminomethyl)phenylboronic acid pinacol ester hydrochloride
97%

679437
4-(Bromomethyl)phenylboronic acid

718831
4-(Carboxymethyl)phenylboronic acid pinacol ester
95%

741809
4-(Diethylamino)phenylboronic acid
95.0%

715492
4-(Dimethylcarbamoyl)phenylboronic acid
≥94%

647292
4-(Diphenylamino)phenylboronic acid
≥95%

702927
4-(Hydroxymethyl)phenylboronic acid pinacol ester
97%

675903
4-(Methanesulfonyl)phenylboronic acid
≥95.0%

456802
4-(Methylthio)phenylboronic acid
≥95%

565814
4-(*N*-Boc-amino)phenylboronic acid
≥95.0%

562351
4-(*N*-Boc-amino)phenylboronic acid pinacol ester
97%

720569
4-(*trans*-2-Carboxyvinyl)phenylboronic acid

439320
4-(Trifluoromethyl)phenylboronic acid
≥95.0%

470821
4-Acetylphenylboronic acid
95%

719382
4-Amino-3-fluorophenylboronic acid hydrochloride

651621
4-Amino-3-nitrophenylboronic acid
technical grade, 90%

683876
4-Aminocarbonylphenylboronic acid
≥95%

708887
4-Aminophenylboronic acid hydrochloride
95%

518751
4-Aminophenylboronic acid pinacol ester
97%

483451
4-Biphenylboronic acid
≥95.0%

718513
4-Bromomethylphenylboronic acid pinacol ester
95%

B75956
4-Bromophenylboronic acid
≥95.0%

698083
4-Bromophenylboronic acid MIDA ester
97%

521493
4-Butylphenylboronic acid
≥95%

720852
4-Carboxy-2-fluorophenylboronic acid pinacol ester
97%

513490
4-Carboxylphenylboronic acid pinacol ester
97%

456772
4-Carboxyphenylboronic acid

417548
4-Chlorophenylboronic acid
95%

521418
4-Cyanophenylboronic acid
≥95%

499986
4-Dibenzothienylboronic acid
≥95.0%

574643
4-Ethoxycarbonylphenylboronic acid
≥95%

499536
4-Ethylphenylboronic acid

721433
4-Ethynylphenylboronic acid pinacol ester
95%

564494
4-Fluoro-2-methoxyphenylboronic acid
≥95%

417556
4-Fluorophenylboronic acid
≥95%

632686
4-Fluorophenylboronic acid neopentylglycol ester
97%

431966
4-Formylphenylboronic acid
≥95.0%

518786
4-Hydroxy-3-methoxyphenylboronic acid pinacol ester
98%

518794
4-Hydroxy-3,5-dimethylphenylboronic acid pinacol ester
97%

523976
4-Hydroxyphenylboronic acid
≥95.0%

8.43854
4-Hydroxyphenylboronic acid
≥97% (acidimetric)

522570
4-Hydroxyphenylboronic acid pinacol ester
97%

471933
4-Iodophenylboronic acid
≥95.0%

699470
4-Iodophenylboronic acid pinacol ester
97%

740837
4-Isoxazoleboronic acid pinacol ester
95%

524018
4-Mercaptophenylboronic acid
90%

639370
4-Methoxy-2-methylphenylboronic acid
≥95%

594539
4-Methoxycarbonylphenylboronic acid
≥95%

594768
4-Methoxycarbonylphenylboronic acid pinacol ester
97%

417599
4-Methoxyphenylboronic acid
≥95.0%

673854
4-Nitrophenylboronic acid
≥95.0%

643890
4-Nitrophenylboronic acid pinacol ester
≥95%

480142
4-Phenoxyphenylboronic acid
≥95.0%

521507
4-Propylphenylboronic acid
≥95%

525057
4-Pyrazoleboronic acid pinacol ester
97%

578770
4-Pyridineboronic acid pinacol ester
97%

634492
4-Pyridinylboronic acid
90%

480053
4-*tert*-Butylphenylboronic acid
≥95.0%

417580
4-Vinylphenylboronic acid
≥95%

718890
4,4′-(Acetylene-1,2-diyl)bis(phenylboronic acid pinacol ester)
95%

456799
4,4′-Biphenyldiboronic acid

655856
4,4,5,5-Tetramethyl-1,3,2-dioxaborolane
97%

458945
4,4,5,5-Tetramethyl-1,3,2-dioxaborolane solution
1.0 M in THF

568155
4,4,5,5,-Tetramethyl-2-phenylsulfanylmethyl-1,3,2-dioxaborolane
97%

632961
5′-Hexyl-2,2′-bithiophene-5-boronic acid pinacol ester
97%

804940
5-Bromo-2-benzofuranboronic acid MIDA ester

557684
5-Bromo-2-thienylboronic acid
≥95%

735345
5-Carboxythiophene-2-boronic acid pinacol ester
96%

721034
5-Chloro-3-pyridineboronic acid
≥95%

512346
5-Formyl-2-furanylboronic acid
≥95%

514055
5-Formyl-2-thienylboronic acid
≥95.0%

695629
5-Hexyl-2-thiopheneboronic acid pinacol ester
97%

578835
5-Indoleboronic acid pinacol ester
97%

666467
5-Indolylboronic acid
≥95%

749087
5-Thiazole boronic acid MIDA ester

654329
6-(1-Piperazinyl)pyridine-3-boronic acid pinacol ester
97%

654337
6-(4-Boc-piperazin-1-yl)pyridine-3-boronic acid pinacol ester
96%

666556
6-Bromo-3-pyridinylboronic acid
≥95%

637386
6-Chloro-3-pyridinylboronic acid
≥95.0%

639184
6-Fluoro-3-pyridinylboronic acid

706094
6-Hydroxypyridine-3-boronic acid pinacol ester
97%

666459
6-Indolylboronic acid
≥95%

748404
6-Methylpyridine-3-boronic acid

641618
6-Quinolineboronic acid pinacol ester
97%

542865
8-Quinolinylboronic acid
technical grade

569364
9,9-Dioctylfluorene-2,7-diboronic acid
96%

324647
Allylboronic acid pinacol ester
97%

417130
Benzene-1,4-diboronic acid
≥95.0%

499978
Benzo[b]thien-2-ylboronic acid
≥95%

512117
Benzo[*b*]thien-3-ylboronic acid
≥95.0%

677779
Benzo[*c*][1,2,5]oxadiazole-5-boronic acid pinacol ester
97%

794287
Bis[(pinacolato)boryl]methane

695157
Bis(3,5-dimethylphenyl)phosphine

473286
Bis(catecholato)diboron
97%

525685
Bis(hexylene glycolato)diboron
96%

518808
Bis(neopentyl glycolato)diboron
96%

473294
Bis(pinacolato)diboron
99%

687650
But-3-enylboronic acid
≥95%

163244
Butylboronic acid
97%

594806
Butylboronic acid *N*,*N*,*N′*,*N′*-tetramethyl-D-tartaric acid diamide ester
97%

518379
Butylboronic acid *N*,*N*,*N′*,*N′*-tetramethyl-L-tartaric acid diamide ester

188913
Catecholborane
98%

688282
***cis*-Crotylboronic acid pinacol ester**

97%

646598
Cyclobutylboronic acid
≥95.0%

710040
Cyclobutylboronic acid MIDA ester
97%

798754
Cyclohexyl-α-MIDA-boryl aldehyde

556580
Cyclohexylboronic acid
≥95%

588415
Cyclopentylboronic acid
≥95%

597988
Cyclopropylboronic acid

697311
Cyclopropylboronic acid MIDA ester
97%

659851
Cyclopropylboronic acid pinacol ester
96%

307890
Dimesitylboron fluoride
90%

709379
Indazole-4-boronic acid hydrochloride

720828
Indazole-6-boronic acid

756016
Indole-2-boronic acid pinacol ester
95%

663212
Isopropenylboronic acid pinacol ester
contains phenothiazine as stabilizer, 95%

648787
Isopropylboronic acid
≥95%

766097
Isoquinoline-6-boronic acid pinacol ester
95%

393614
***m*-Tolylboronic acid**
97%

165336
Methylboronic acid
97%

746177
MIBA
96%

718181
***N*-4-Methanesulfonamidephenylboronic acid**
≥95%

706531
***N*-Boc-1,2,3,6-tetrahydropyridine-4-boronic acid pinacol ester**
95%

715263
***N*-Boc-1*H*-pyrazole-4-boronic acid**
≥95%

15047
***N*-Boc-2-pyrroleboronic acid**
≥98.0% (T)

680516
***N*-Boc-5-methoxy-2-indolylboronic acid**
≥95%

675911
***N*-Boc-indole-2-boronic acid**
≥95%

715387
***N*-Boc-piperidine-4-boronic acid pinacol ester**
97%

733539
***N*-Boc-pyrrole-2-boronic acid MIDA ester**
95%

N257
Naphthalene-1-boronic acid
≥95.0%

683671
Neopentylboronic acid
≥95%

393606
***o*-Tolylboronic acid**
≥95.0%

393622
***p*-Tolylboronic acid**
97%

588423
Phenethylboronic acid

793418
Phenyl-α-MIDA-boryl aldehyde

P20009
Phenylboronic acid
95%

78181
Phenylboronic acid
purum, ≥97.0% (HPLC)

698032
Phenylboronic acid MIDA ester
95%

632678

Phenylboronic acid neopentylglycol ester
97%

647098
Phenylboronic acid pinacol ester
97%

901062
Pinacol (dichloromethyl) boronate
≥95%

753726
Piperidine-4-boronic acid pinacol ester hydrochloride
95%

542873
Pyrene-1-boronic acid
≥95.0%

715476
Pyrido[2,3-*b*]pyrazin-7-ylboronic acid pinacol ester
97%

708631
Quinoxaline-6-boronic acid pinacol ester
97%

753602
Tetrahydropyran-4-boronic acid pinacol ester

754242
Tetrahydroxydiboron
95%

579386
***trans*-1-Heptenylboronic acid**

576638
***trans*-1-Propen-1-ylboronic acid**
≥95.0%

735558
***trans*-1-Propenylboronic acid pinacol ester**
97%

519022
***trans*-2-[4-(Trifluoromethyl)phenyl]vinylboronic acid**

≥95%

804916
***trans*-2-(4-Bromophenyl)vinylboronic acid MIDA ester**

518972
***trans*-2-(4-Fluorophenyl)vinylboronic acid**
95%

518980
***trans*-2-(4-Methoxyphenyl)vinylboronic acid**
≥95%

568139
***trans*-2-(4-Methylphenyl)vinylboronic acid**
97%

729221
***trans*-2-(Pinacol boronate)vinylboronic acid MIDA ester**
96%

703478
***trans*-2-Bromovinylboronic acid MIDA ester**
technical grade

556599
***trans*-2-Chloromethylvinylboronic acid**
≥95%

680249
***trans*-2-Chloromethylvinylboronic acid pinacol ester**
97%

731528
***trans*-2-Ethoxyvinylboronic acid pinacol ester**
95%

473790
***trans*-2-Phenylvinylboronic acid**
97%

570214
***trans*-2-Phenylvinylboronic acid pinacol ester**

642606
***trans*-3-Phenyl-1-propen-1-ylboronic acid**
≥95%

691623
***trans*-Crotylboronic acid pinacol ester**
95%

236608
Tri-*tert*-butyl borate
98%

90795
Tributyl borate
≥99.0% (T)

T59307
Triethyl borate
99%

197335
Triisopropyl borate
≥98%

8.41264
Triisopropyl borate
for synthesis

T70203
Trimethoxyboroxine
95%

92330
Trimethyl borate
purum, ≥99.0% (GC)

452920
Trimethyl borate
≥98%

447218
Trimethyl borate
99.999% (trace metal basis)

443999
Trimethyl borate
purified by redistillation, ≥99.5%

8.21180
Trimethyl borate
for synthesis

323136
Trimethylboroxine
99%

418714
Triphenyl borate
≥97%

790877
Tris(2,2,2-trifluoroethyl) borate
97%

348635
Tris(trimethylsilyl) borate
99%

568147
Vinylboronic acid dibutyl ester
97%

704415
Vinylboronic acid MIDA ester
97%

633348
Vinylboronic acid pinacol ester
contains phenothiazine as stabilizer, 95%

637998
Vinylboronic anhydride pyridine complex
95%

Coupling Reagents & Nucleosides

Oligo Synthesis Cycle

Oligo Synthesis Cycle

Oligo Synthesis Cycle

We offer a collection of useful building blocks, coupling reagents, and nucleosides for applications in oligo synthesis and beyond. Nucleosides and modified nucleosides are the basic structural units that make up nucleic acids (DNA and RNA), which are responsible for encoding, transmitting and expressing genetic information in all living things. Oligonucleotide synthesis outside of biological systems is the chemical synthesis of nucleic acids of a predetermined sequence that may contain nucleosides beyond those that are naturally occurring. Typical oligonucleotide synthesis using nucleoside phosphoramidites occurs in a four-step process: deblocking, coupling, capping, and oxidation. Coupling reagents play an important role in these steps, efficient coupling activators assuring the reactions are fast and nearly quantitative.

The ability to incorporate non-natural nucleosides into nucleic acids has led to many research uses such as:

- sequence detection
- hydrolysis resistance
- sequencing
- enzyme inhibition

Nucleoside chemistry has produced non-natural analogs that have been useful in medicine with chemotherapeutic and antiviral applications, such as reverse transcriptase inhibition. Our selection of unnatural bases, nucleoside derivatives and intermediates will provide you with a useful starting point for your oligo or nucleoside analog synthesis needs.

858412
(−)-2-Amino-6-mercaptopurine riboside hydrate
98%

ALD00602
(–)-PSI Reagent
95%

ALD00604
(+)-PSI Reagent
95%

T511293
(2′*S*)-2′-Deoxy-2′-fluoro-5-ethynyluridine, (F-ara-EdU)
Aldrich^{CPR}

852198
2′-Deoxyadenosine 5′-monophosphate monohydrate
98%

854999
2′-Deoxyguanosine hydrate

99%

I22404
2′,3′-*O*-Isopropylideneadenosine
98%

802999
2-Acetamido-2-deoxy-β-D-glucopyranosylamine
97% (HPLC)

302309
2-Cyanoethyl *N*,*N*-diisopropylchlorophosphoramidite
Cl 13.5-15.5 %

305995
2-Cyanoethyl *N*,*N*,*N*′,*N*′-tetraisopropylphosphorodiamidite
97%

656399
2-Fluoro-2′-deoxyadenosine
96%

656402
2-Fluoroadenosine
97%

663115
2-Iodoadenosine
97%

361275
3′-Deoxy-3′-fluorothymidine
97%

850187
5-Bromouridine
98%

809705
5-DBCO-PEG$_4$-dUTP, 10mM Aqueous Solution

909475
5-Ethynyl uridine
≥95%

T511307

5-Ethynyl-2′-deoxycytidine, (EdC)
Aldrich[CPR]

900584
5-Ethynyl-2′-deoxyuridine
95%

8.18505
5-Fluorouracil
for synthesis

535893
5-Methyluridine
97%

713465
6-Chloro-3-methyluracil
≥98%

496812
7-Allyl-7,8-dihydro-8-oxoguanosine
95%

858463
8-Bromoadenosine 3′,5′-cyclic monophosphate sodium salt monohydrate
98%

766011
8-Bromoinosine
95%

8.57001
Activator Reagent for DNA Synthesis
0.3M BMT in MeCN, Novabiochem®

8.57000
Activator solution for DNA Synthesis
0.25M 5-(Ethylthio)-1H-Tetrazole in MeCN, Novabiochem®

A26209
Adenosine 5′-triphosphate disodium salt hydrate
99%

766305
Bis(2-cyanoethyl)-*N*,*N*-diisopropylphosphoramidite
95%

909505
C8-Alkyne-dU-CEP

8.57002
Capping Reagent A for DNA Synthesis
20% n-Methylimidazole in MeCN (v/v), Novabiochem®

8.57011
Capping Reagent A for DNA Synthesis
Tetrahydrofuran : Acetic Anhydride : Pyridine 77/12/11 (w/w/w), Novabiochem®

8.57012
Capping Reagent B for DNA Synthesis
1-Methylimidazole : Tetrahydrofuran 18/82 (w/w), Novabiochem®

8.57005
Capping Reagent B1 for DNA Synthesis
40% Acetic anhydride in MeCN (v/v), Novabiochem®

8.57006
Capping Reagent B2 for DNA Synthesis
60% Lutidine in MeCN (v/v), Novabiochem®

1.18609
Capping Reagent for DNA Synthesis
N-Methylimidazole/Tetrahydrofuran/Pyridine 1/8/1 (v/v/v), Novabiochem®

118605
Capping Reagent for DNA Synthesis
Tetrahydrofuran/Acetic anhydride 9/1 (v/v), Novabiochem®

118603
Capping Reagent for DNA Synthesis
Tetrahydrofuran/2,6-Lutidine/Acetic anhydride 8/1/1 (v/v/v), Novabiochem®

8.57010
Cleavage Reagent for DNA Synthesis
20% DEA in MeCN, Novabiochem®

C122106
Cytidine
99%

BI0832
Deblocking Reagent 3% Dichloroacetic Acid in Toluene
Novabiochem®

8.57014
Deblocking Reagent B for DNA Synthesis
2% Trichloroacetic Acid in Dichloromethane (w,w), Novabiochem®

1.18619
Deblocking Reagent for DNA Synthesis

8.57007
Deblocking Reagent for DNA Synthesis
3% Dichloroacetic acid in Toluene (v/v), Novabiochem®

419362
Di-*tert*-butyl *N,N*-diisopropylphosphoramidite
95%

416436
Dibenzyl *N,N*-diisopropylphosphoramidite
technical grade, 90%

808520
γ-[(6-Azidohexyl)-imido]-ATP sodium salt

808512
γ-[(Propargyl)-imido]-ATP sodium salt

392561
Methyl *N,N,N′,N′*-tetraisopropylphosphorodiamidite
97%

586846
***N*-Benzoyladenosine**
96%

766038
N,N′-Bis[2-(2-*tert*-butyldimethylsilyloxyethoxy)ethyl]-3,4,9,10-perylenetetracarboxylic diimide
97%

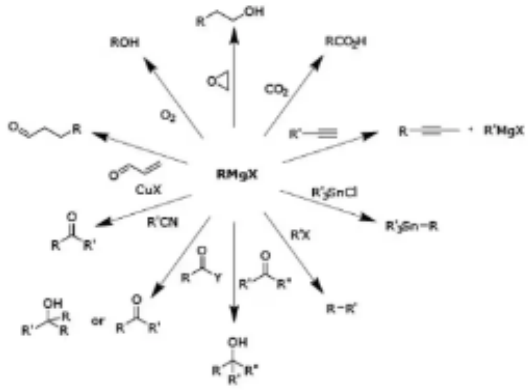
M2780
***N*^{6}-Methyladenosine 5′-monophosphate sodium salt**
≥97% (HPLC)

808490
N^6-Propargyl-ATP sodium salt

8.57013
Oxidizing Reagent B for DNA Synthesis
1-Methylimidazole : Tetrahydrofuran 18/82 (w/w), Novabiochem®

8.57008
Oxidizing Reagent for DNA Synthesis
0.05M Iodine in Pyridine, Novabiochem®

Grignard Reagents



Grignard reagents are highly reactive organomagnesium halides formed by the reaction of magnesium metal with alkyl or alkenyl halides. They are very strong bases and react with acidic hydrogens such as alcohols, water and carboxylic acids. Our comprehensive portfolio of Grignard reagents, used in the Grignard reaction to form new carbon-carbon bonds, will make your breakthroughs feel closer than ever.

WHAT IS A GRIGNARD REAGENT?

A Grignard reagent is an organomagnesium halide having a formula of RMgX, where X is a halogen (-Cl, -Br, or -I), and R is an alkyl or aryl (based on a benzene ring) group. To initiate a Grignard Reaction, a Grignard reagent is added to a ketone or aldehyde, to form a tertiary or secondary alcohol. The reaction with formaldehyde leads to a primary alcohol.

Grignard reagents can be used for determining the number of halogen atoms present in a halogen compound. Grignard degradation is used for the chemical analysis of certain triacylglycerols as well as many cross-coupling reactions for the formation of several carbon-carbon and carbon-heteroatom bonds. Industrially, the Grignard reaction is the key step in the production of Tamoxifen, which is used in the treatment of breast cancer.

MAKING A GRIGNARD REAGENT

Grignard reagents are produced from the heated combination of halogenoalkane and magnesium in the presence of diethyl ether (ethoxyethane). The reaction should be kept dry to avoid the resulting Grignard reagent from reacting with water.

561657
(1,3-Dioxan-2-ylethyl)magnesium bromide solution
0.5 M in THF

472611
(1,3-Dioxolan-2-ylmethyl)magnesium bromide solution
0.5 M in THF

630551
(2-Ethylhexyl)magnesium bromide solution
1.0 M in diethyl ether

687952
(Cyclohexylmethyl)magnesium bromide solution

256021
(Trimethylsilyl)methylmagnesium chloride solution
1.0 M in diethyl ether

419605
1-Methyl-1-propenylmagnesium bromide solution
0.5 M in THF

420042
1-Methyl-2-propenylmagnesium chloride solution
0.5 M in THF

561673
1-Naphthylmagnesium bromide solution
0.25 *M* slurry in THF

429007
1-Propynylmagnesium bromide solution
0.5 M in THF

277282
1,1-Dimethylpropylmagnesium chloride solution
1.0 M in diethyl ether

673013
2-Benzyloxyphenylmagnesium bromide solution
1.0 M in THF

639125
2-Biphenylmagnesium bromide solution
0.5 M in diethyl ether

562149
2-Bromobenzylmagnesium bromide solution
0.25 M in diethyl ether

227234
2-Mesitylmagnesium bromide solution
1.0 M in THF

332402
2-Mesitylmagnesium bromide solution
1.0 M in diethyl ether

562092
2-Methoxybenzylmagnesium chloride solution

0.25 M in THF

470414
2-Methoxyphenylmagnesium bromide solution
1.0 M in THF

419613
2-Methyl-1-propenylmagnesium bromide solution
0.5 M in THF

420204
2-Methyl-2-phenylpropylmagnesium chloride solution
0.5 M in diethyl ether

773530
2-Methylallylmagnesium bromide solution
0.5 M in THF

419532
2-Methylallylmagnesium chloride solution
0.5 M in THF

744069
2-Methyltetrahydrofuran
absolute, stored over molecular sieve

562165
2-Naphthylmagnesium bromide solution
0.5 M in THF

550442
2-Thienylmagnesium bromide solution
1.0 M in THF

550213
2,2-Dimethylpropylmagnesium chloride solution
1.0 M in diethyl ether

757969
2,2-Dimethylpropylmagnesium chloride solution
1.0 M in THF

703540
2,2,6,6-Tetramethylpiperidinylmagnesium chloride lithium chloride complex solution
1.0 M in THF/toluene

563757

2,3-Dimethylphenylmagnesium bromide
0.5 M in THF

562025
2,4-Dimethoxyphenylmagnesium bromide solution
0.5 M in THF

731749
2,4,6-Triisopropylphenylmagnesium bromide solution
0.5 M in THF

563765
2,5-Dimethylphenylmagnesium bromide
0.5 M in THF

425508
2,6-Dimethylphenylmagnesium bromide solution
1.0 M in THF

372005
3-[Bis(trimethylsilyl)amino]phenylmagnesium chloride solution
1.0 M in THF

562130
3-Bromobenzylmagnesium bromide solution
0.25 M in diethyl ether

419591
3-Butenylmagnesium bromide solution
0.5 M in THF

563676
3-Chloro-4-fluorophenylmagnesium bromide solution
0.5 M in THF

563722
3-Chlorophenylmagnesium bromide
0.5 M in THF

550671
3-Fluorophenylmagnesium bromide solution
1.0 M in THF

562084
3-Methoxybenzylmagnesium chloride solution
0.25 M in THF

442194
3-Methoxyphenylmagnesium bromide solution
1.0 M in THF

562211
3-Methyl-2-thienylmagnesium bromide solution
0.5 M in THF

562157
3-Methylbenzylmagnesium chloride solution
0.5 M in THF

561630
3-Thienylmagnesium iodide solution
0.3 M in THF

562270
3,4-Dichlorophenylmagnesium bromide solution
0.5 M in THF

561037
3,4-Difluorophenylmagnesium bromide solution
0.5 M in THF

561975
3,4-Dimethoxyphenylmagnesium bromide solution
0.5 M in THF

561797
3,4,5-Trifluorophenylmagnesium bromide solution
0.3 M in THF

680974
3,4,5-Trimethoxyphenylmagnesium bromide solution
0.5 M in THF

639052
3,5-Bis(trifluoromethyl)phenylmagnesium bromide solution
0.5 M in THF

562289
3,5-Dichlorophenylmagnesium bromide solution
0.5 M in THF

561029
3,5-Difluorophenylmagnesium bromide solution
0.5 M in THF

563811
3,5-Dimethoxybenzylmagnesium chloride solution
0.2 M in THF

562076
3,5-Dimethylphenylmagnesium bromide solution
0.5 M in THF

637963
3,7-Dimethyloctylmagnesium bromide solution
1.0 M in diethyl ether

734098
4-[Bis(trimethylsilyl)amino]phenylmagnesium bromide solution
0.5 M in THF

561061
4-(*N*,*N*-Dimethyl)aniline magnesium bromide solution
0.5 M in THF

663832
4-(Trifluoromethoxy)benzylmagnesium bromide solution
1.0 M in diethyl ether

687901
4-(Trifluoromethoxy)phenylmagnesium bromide solution
0.5 M in THF

672998
4-Benzyloxyphenylmagnesium bromide solution
1.0 M in THF

562009
4-Biphenylmagnesium bromide solution
0.5 M in THF

562254
4-Chloro-3-fluorophenylmagnesium bromide solution
0.5 M in THF

774448
4-Chlorophenylmagnesium bromide solution
1.0 M in 2-methyltetrahydrofuran

262188
4-Chlorophenylmagnesium bromide solution
1.0 M in diethyl ether

561738
4-Fluoro-2-methylphenylmagnesium bromide solution
0.5 M in THF

563927
4-Fluorobenzylmagnesium chloride
0.25 M in THF

245550
4-Fluorophenylmagnesium bromide solution
2.0 M in diethyl ether

328820
4-Fluorophenylmagnesium bromide solution
1.0 M in THF

635669
4-Isopropylphenylmagnesium bromide solution
0.5 M in THF

562238
4-Methoxy-2-methylphenylmagnesium bromide solution
0.5 M in THF

562033
4-Methoxybenzylmagnesium chloride solution
0.25 M in THF

470260
4-Methoxyphenylmagnesium bromide solution
0.5 M in THF

563773
4-Methylbenzylmagnesium chloride solution
0.5 M in THF

761206
4-Pentenylmagnesium bromide solution
0.5 M in THF

561681
4-Phenoxyphenylmagnesium bromide solution
0.5 M in THF

706507
4-*tert*-Butylphenylmagnesium bromide solution
0.5 M in THF

324655
4-*tert*-Butylphenylmagnesium bromide solution
2.0 M in diethyl ether

563749
9-Phenanthrylmagnesium bromide
0.5 M in THF

256609
Allylmagnesium bromide solution
1.0 M in diethyl ether

225754
Allylmagnesium bromide solution
1.0 M in diethyl ether

225908
Allylmagnesium chloride solution
2.0 M in THF

225916
Benzylmagnesium chloride solution
2.0 M in THF

302759
Benzylmagnesium chloride solution
1.0 M in diethyl ether

291005
Butylmagnesium chloride solution
2.0 M in THF

224375
Butylmagnesium chloride solution
2.0 M in diethyl ether

224413
Cyclohexylmagnesium chloride solution
2.0 M in diethyl ether

774677
Cyclohexylmagnesium chloride solution
1.0 M in 2-methyltetrahydrofuran

752134
Cyclohexylmagnesium chloride solution
1.3 M in THF/toluene (1:1)

428337

Cyclopentylmagnesium bromide solution
2.0 M in diethyl ether

224405
Cyclopentylmagnesium chloride solution
2.0 M in diethyl ether

526797
Cyclopropylmagnesium bromide solution
0.5 M in THF

772844
Cyclopropylmagnesium bromide solution
1.0 M in 2-methyltetrahydrofuran

347108
Decylmagnesium bromide solution
1.0 M in diethyl ether

345113
Di-*n*-butylmagnesium solution
1.0 M in heptane

339628
Dodecylmagnesium bromide solution
1.0 M in diethyl ether

189871
Ethylmagnesium bromide solution
3.0 M in diethyl ether

345105
Ethylmagnesium bromide solution
1.0 M in *tert*-butyl methyl ether

703591
Ethylmagnesium bromide solution
3.4 M in 2-methyltetrahydrofuran

364673
Ethylmagnesium bromide solution
1.0 M in THF

300330
Ethylmagnesium chloride solution
2.0 M in diethyl ether

303828
Ethylmagnesium chloride solution

2.0 M in THF

346152
Ethynylmagnesium bromide solution
0.5 M in THF

346160
Ethynylmagnesium chloride solution
0.5 M in THF

550655
Heptylmagnesium bromide solution
1.0 M in diethyl ether

255025
Hexylmagnesium bromide solution
2.0 M in diethyl ether

641626
Hexylmagnesium chloride solution
2.0 M in THF

338257
Isobutylmagnesium bromide solution
2.0 M in diethyl ether

479683
Isobutylmagnesium chloride solution
2.0 M in THF

225746
Isobutylmagnesium chloride solution
2.0 M in diethyl ether

772836
Isopropenylmagnesium bromide solution
1.0 M in 2-methyltetrahydrofuran

419567
Isopropenylmagnesium bromide solution
0.5 M in THF

703567
Isopropylmagnesium bromide solution
2.9 M in 2-methyltetrahydrofuran

775797
Isopropylmagnesium bromide solution
0.75 M in THF

656984
Isopropylmagnesium chloride lithium chloride complex solution
1.3 M in THF

224383
Isopropylmagnesium chloride solution
2.0 M in diethyl ether

230111
Isopropylmagnesium chloride solution
2.0 M in THF

63035
Magnesium
purum, for Grignard reactions, ≥99.5%, turnings

8.18894
Magnesium ethylate
for synthesis

703583
Methylmagnesium bromide solution
~3.4 M in 2-methyltetrahydrofuran

302430
Methylmagnesium bromide solution
1.0 M in dibutyl ether

282235
Methylmagnesium bromide solution
1.4 M in THF: toluene (1:3)

257087
Methylmagnesium bromide solution
3.0 M in diethyl ether

189898
Methylmagnesium bromide solution
3.0 M in diethyl ether

189901
Methylmagnesium chloride solution
3.0 M in THF

254363
Methylmagnesium iodide solution
3.0 M in diethyl ether

776270

***n*-Propylmagnesium chloride solution**
1.0 M in 2-methyltetrahydrofuran

298980
***o*-Tolylmagnesium bromide solution**
2.0 M in diethyl ether

360023
***o*-Tolylmagnesium chloride solution**
1.0 M in THF

394262
Octadecylmagnesium chloride solution
0.5 M in THF

436291
Octylmagnesium bromide solution
2.0 M in diethyl ether

324566
Octylmagnesium chloride solution
2.0 M in THF

442178
***p*-Tolylmagnesium bromide solution**
1.0 M in THF

646075
***p*-Tolylmagnesium bromide solution**
0.5 M in diethyl ether

424056
Pentadecylmagnesium bromide solution
0.5 M in diethyl ether

442585
Pentafluorophenylmagnesium bromide solution
0.5 M in diethyl ether

290998
Pentylmagnesium bromide solution
2.0 M in diethyl ether

424684
Phenethylmagnesium chloride solution
1.0 M in THF

357510
Phenylethynylmagnesium bromide solution
1.0 M in THF

703575

Phenylmagnesium bromide solution
2.9 M in 2-methyltetrahydrofuran

331376
Phenylmagnesium bromide solution
1.0 M in THF

171565
Phenylmagnesium bromide solution
3.0 M in diethyl ether

257125
Phenylmagnesium chloride solution
2.0 M in THF

224448
Phenylmagnesium chloride solution
2.0 M in THF

224391
Propylmagnesium chloride solution
2.0 M in diethyl ether

224421
***sec*-Butylmagnesium chloride solution**
2.0 M in diethyl ether

364649
***tert*-Butylmagnesium chloride solution**
1.0 M in THF

224499
***tert*-Butylmagnesium chloride solution**
2.0 M in diethyl ether

337781
Tetradecylmagnesium chloride solution
1.0 M in THF

257257
Vinylmagnesium bromide solution
1.0 M in THF

225584
Vinylmagnesium bromide solution
1.0 M in THF

476552
Vinylmagnesium chloride solution
1.6 M in THF

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Ярославль (4852)69-52-93

Россия +7(495)268-04-70
Казахстан +7(7172)727-132
Киргизия +996(312)96-26-47

www.sigmaaldrich.nt-rt.ru | | scx@nt-rt.ru