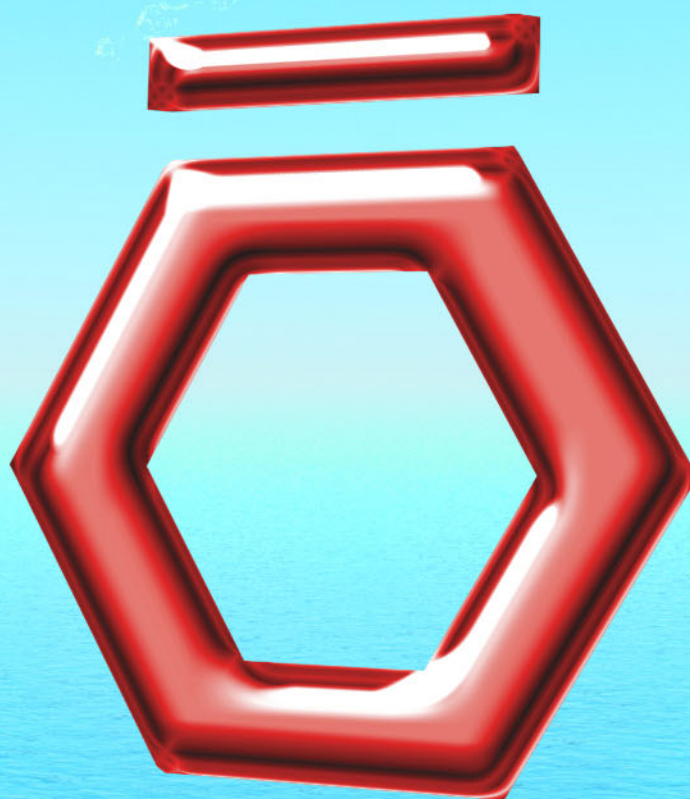


ORGANOLITHIUM COMPOUNDS



Архангельск (8182)63-90-72
Астана (7172)727-132
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Брянск (4832)59-03-52
Владивосток (423)249-28-31
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
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
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
Новосибирск (383)227-86-73
Омск (3812)21-46-40
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Оренбург (3532)37-68-04
Пенза (8412)22-31-16

Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
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Саратов (845)249-38-78
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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
Тверь (4822)63-31-35
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Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
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Хабаровск (4212)92-98-04
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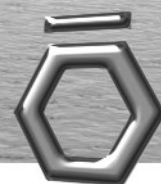
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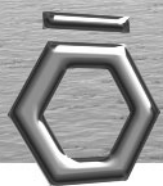


Over 20 new organometallics are available in a variety of formulations and pack sizes for the demanding chemist.



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I. Introduction

Organometallic compounds are amongst the most often used reagents in organic synthesis.

The earliest organometallic compound was already discovered in the early 19th century ("Zeise's salt"; a zinc-olefin complex was first reported in 1827!) and first examples of synthetic organometallic chemistry are the organozinc-compounds, discovered by Edward Frankland in 1849, the organo-magnesium compounds discovered by Victor Grignard and his teacher Philippe Barbier in 1901 and the organolithium compounds, discovered by Wilhelm Schlenk in 1917⁽¹⁾

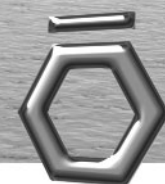
But only since the 1950th, based on the pioneering work of Georg Wittig and Henry Gilman, organometallic reagents became a routinely used tool in the synthetic organic laboratory.

A very early but still invaluable application of organometallic reagents is the olefin-polymerisation with the so-called Ziegler-Natta-catalyst (Invented in 1953, Nobel price for Karl Ziegler and Giulio Natta in 1963).⁽²⁾

The usage of organometallic compounds can be classified in several major applications:

- *Strong bases*
- *Nucleophiles*
- *Metal exchange*
- *Reducing agents*
- *Polymerisation initiator/catalyst*
- *Catalysts for organic reactions*
- *Material sciences*

The following brochure will give an overview of the properties and typical reactions of organolithium compounds in some fields of organic chemistry and the product range offered by Acros Organics.



II. Organolithium compounds^{3,4}, properties & structures

Alkylolithium compounds are widely used as very strong bases, nucleophiles and reagents for metallations in organic synthesis. The following table⁵ shows, that alkanes and arenes are very weak acids, hence their corresponding lithium-derivatives are extremely strong bases.

The most common members of the alkylolithium-family are n-butyllithium, methyllithium and tert-butyllithium (for which 2-methylpropane is the corresponding acid).

Simple alkylolithium-compounds are soluble in hydrocarbon- and in ether-solvents (although the more basic compounds can react with the latter) forming aggregates of mostly dimeric, tetrameric or hexameric species^{6,7}. The aggregation⁸ and, as a consequence, the reactivity of organolithiumcompounds can be strongly influenced by the solvent and/or complexing co-solvents^{9,10}

Compound	pKa
2-Methylpropane	53.0
Ethane	50.0
Methane	48.0
Ethene	44.0
Benzene	43.0
Ammonia	38.0
Ethyne	25.0
Ethanol	16.0
Water	15.7

Strong complexing agents like i.e. N,N,N',N'-tetramethylethylenediamine are able to cleave the aggregates to form monomeric alkylolithium-complexes which are then much more reactive.

The mixture of n-butyllithium with potassium-tert-butanolate is called "Superbase"^{11,12,13,14}.

Aggregation of Organolithium-reagents in various solvents

Compound	Solvent	Aggregation number
MeLi	THF	4
MeLi	DEE	4
n-BuLi	Cyclohexane	6
n-BuLi	THF	4 / 2
sec-BuLi	Cyclopentane	4
sec-BuLi	THF	2 / 1
tert-BuLi	Hexane	4
tert-BuLi	DEE	2
tert-BuLi	THF	1

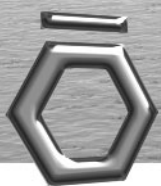
MeLi = Methyllithium • n-BuLi = n-Butyllithium • sec-BuLi = sec-Butyllithium • tert-BuLi tert.-Butyllithium • DEE = Diethylether • THF = Tetrahydrofuran

Products available from Acros Organics

TMEDA 99% N,N,N',N'-Tetramethylethylenediamine	13845
DMPU 97% N,N-Dimethylpropylenurea	22464
DABCO 97% 1,4-Diazabicyclo[2,2,2]octane	11247
Potassium-tert-butanolate 98+%	16888
Potassium-tert-butanolate 20% in THF	36499

Literature References:

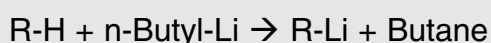
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III. Reactions of organolithium compounds

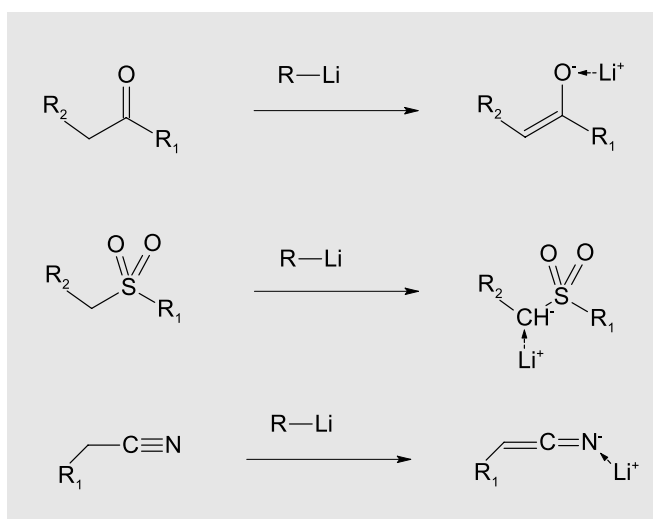
a. Metallation

Many hundreds of functionalised organolithium compounds have been prepared by the metallation reaction with n-butyllithium (or other alkylolithium compounds).



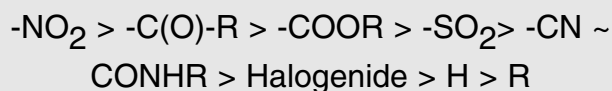
The metallation uses the fact that the strong bases like n-butyllithium are capable to deprotonate organic molecules if they have "acidic" protons.

Such "acidic" protons in organic molecules are mostly found at positions where a negatively charged anion is stabilised by a suitable functional group. Such molecules are i.e.:



- carbonyl compounds like aldehydes, ketones, esters, imines etc
- sulfones, sulfoxides, sulfoximides
- nitriles
- terminal acetylenes
- nitro-compounds
- benzylic systems

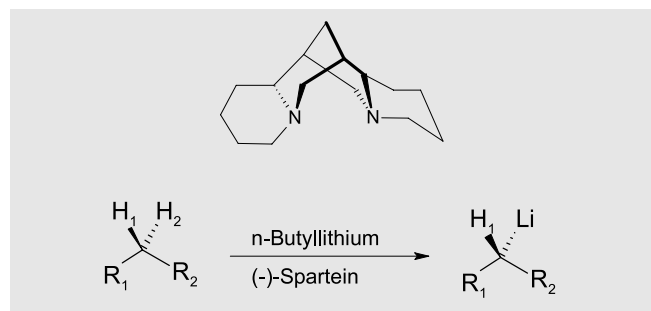
The stabilisation of carbanions by functional groups follows the order¹⁵:



The stabilisation of such carbanions is influenced by mesomeric and inductive effects and the hybridisation of the anionic carbon.

The resulting enolates, sulfonyl^{16,17}- and sulfinyl¹⁸-carbanions are valuable intermediates for aldol-condensations and many other reactions.

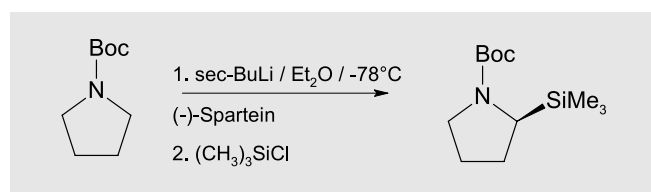
By using chiral-chelating ligands like (-)-spartein it is possible to deprotonate a prochiral substrate with high enantiomeric excess^{19,20} to chiral organolithium compounds²¹.



Products available from Acros Organics

(-)-Sparteine sulfate pentahydrate	21562
n-Butyllithium 1.6 M solution in hexanes	18127

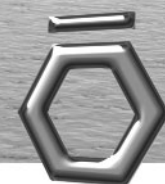
An example for the enantioselective deprotonation is the synthesis of (S)-2-trimethylsilyl-N-Boc-pyrrolidine²².



Literature References:

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- 16 E. Block, *Reactions of Organosulfur Compounds*, Academic Press New York 1978.
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- 19 D. Hoppe, Th. Hense, *Angew. Chem.* 1997, 109, 2376.

- 20 V. K. Aggarwal, *Angew. Chem.* 1994 106, 185.
- 21 O. Zschage, J. R. Schwark, D. Hoppe, *Angew. Chem.* 1990, 102, 336, P. Beak, A. Basu, D. J. Gallagher, Y. S. Park, S. Thayumanavan *Acc. Chem. Res.* 1996 29, 552, D. J. Pippel, G. A. Weissenburger, S. R. Wilson, P. Beak, *Angew. Chem.* 1998 110 2600
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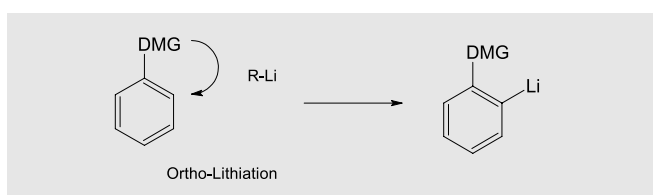
The metallation of diisopropylamine with *n*-butyllithium yields the very important organic base lithium-diisopropylamide (LDA). LDA is strong enough to deprotonate most organic molecules, but due to its bulky, sterically hindered substituents, it is not nucleophilic. LDA is the preferred base²³ for the deprotonation of substrates, where a nucleophilic attack is also possible.

Products available from Acros Organics

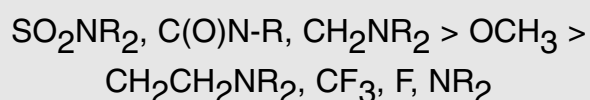
Diisopropylamine, 99%	15907
Lithiumdiisopropylamide, 2 M in THF/Heptane	26883
sec-Butyllithium 1.3 M solution in cyclohexane/hexane (92/8)	18754

b. Ortho-metallation²⁴

Metallation of an aromatic ring near a substituent, which acts as a "Directed Metallation Group", is called "Ortho-Metallation". Several groups can function as DMG's, i.e. sulfones, sulfonamides, amines²⁵, amides²⁶, carbamates²⁷, thio-²⁸ and methoxy groups, they have in common the ability to coordinate the approaching cation (= lithium-ion) and/or to increase the acidity of the ortho-hydrogen.



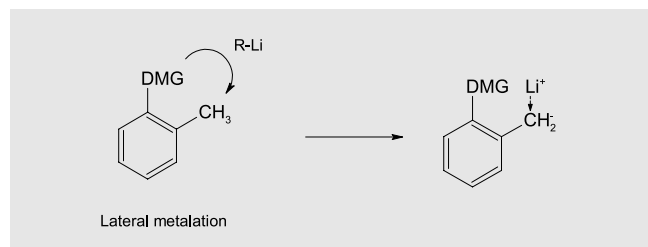
The relative rate of directed metallation follows the order²⁹



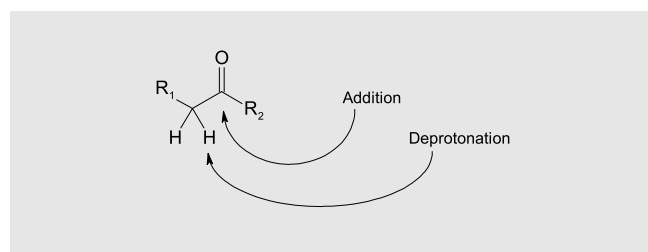
Literature References:

- 23 For Lithiumdiethylamide Fieser & Fieser Reagents for Organic Synthesis 1 611; for LDA: Fieser & Fieser Reagents for Organic Synthesis 2 249, 3 184, 4 298, 5 400; 6 334, 7 204, 8 292, 9 280, 10 241, 11 296, 12 277, 13 163, 14 193, 15 188, 16 196, 17 165.
- 24 For a review of ortho-metallation, see: V.Snieckus, Chem. Rev. 1990, 90, 879.
- 25 Organic Syntheses, CV 6, 478; A. Heßler, K. W. Kottsieper, S. Schenk, M. Tepper, and O. Stelzer, Z. Naturforsch. 56 b, 347–353 (2001);
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- 27 Alan C. Spivey, Tomasz Fekner, Sharon E. Spey, and Harry Adams, J. Org. Chem. 1999, 64, 9430-9443.
- 28 HanVinhHuynh, W. W. Seidel, Th. Lügger, R. Fröhlich, B. Wibbeling, and F. E. Hahn, Z. Naturforsch. 57 b, 1401–1408 (2002);

A special form of ortho-lithiation is the "lateral-metallation". In this reaction a benzylic hydrogen is abstracted due to the higher acidity compared with the ring-hydrogens. Besides butyllithium also lithium-diisopropylamide is a useful base for this reaction.



c. Nucleophilic addition and substitution



Stabilized organolithium compounds like enolates and sulfonylcarbanions can react as nucleophiles³⁰ with alkyl-halogenides and carbonyl-compounds in a wide range of reactions:

- Alkylation of Alkylhalogenides
- Addition to Carbonylcompounds³¹
- Alkylation of Allylhalogenides
- Epoxide-Ring Opening³²
- Conjugate Addition³³
- Addition to Carbondioxide³⁴

29 D.W.Slocum, C.A.Jennings, J.Org.Chem. 1976 41 3653.

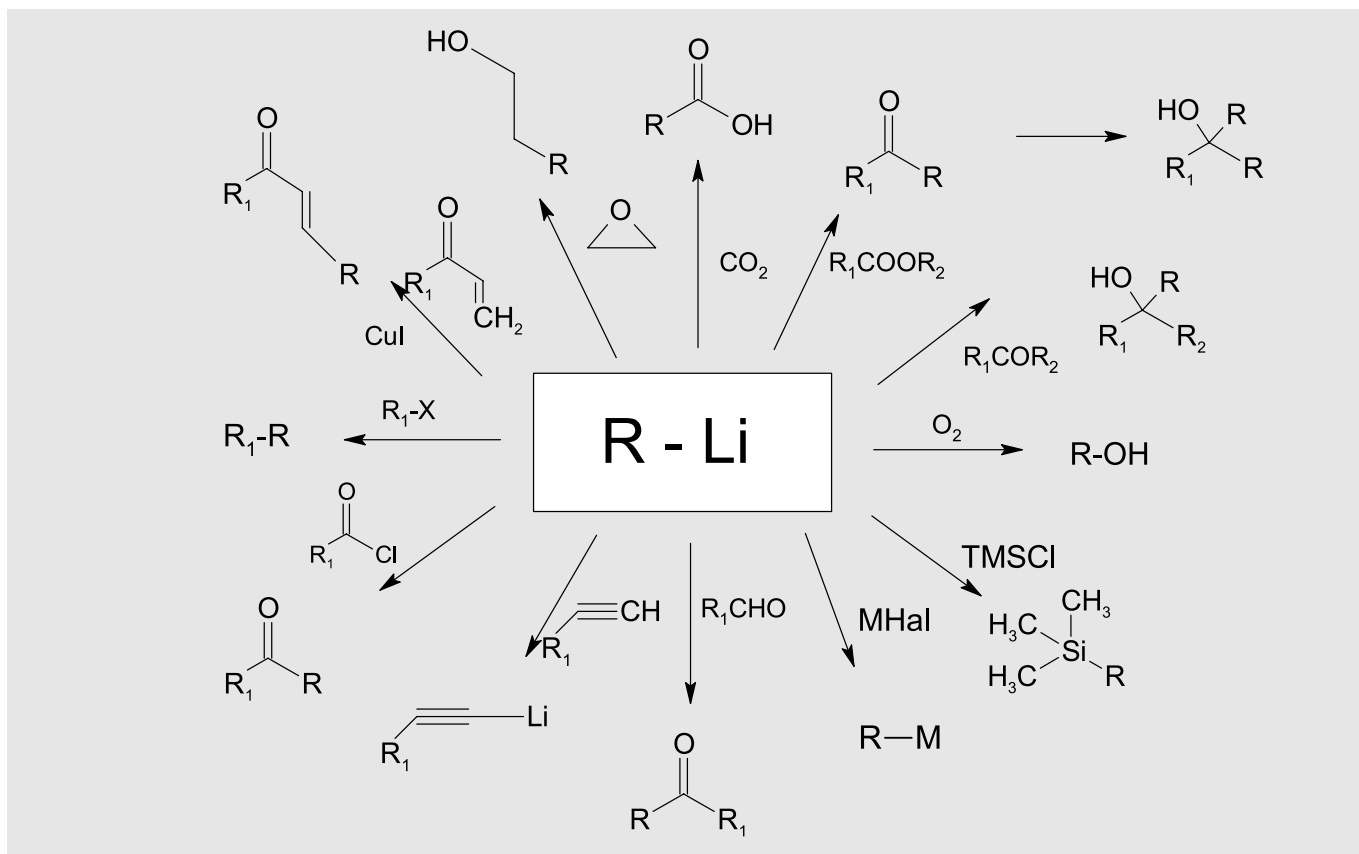
30 For Alkylolithium-compounds like Butyllithium and Methylolithium the corresponding cuprates react more selective see Lit 42

31 Addition to Tosylhydrazione: A. G. Myers and M. Movassaghi, J. Am. Chem. Soc. 1998, 120, 8891-8892.

32 R.C.Larock, Comprehensive Organic Transformations VCH, New York 1989. p 512.

33 R.C.Larock, Comprehensive Organic Transformations VCH, New York 1989. p 792.

34 Leads with excess of RLi to ketones: T.M.Bare, H.O.House, Org.Synth. 49 (1969) 81.



Simple, non-stabilized, alkyllithium reagents can react in the same way, but often they have to be transferred to more nucleophilic and less basic reagents like dialkyllithiumcuprates⁴³ to avoid deprotonation as a side reaction.

The addition to prochiral carbonyl-compounds can be enantioselective by using chiral ligands^{35,36}.

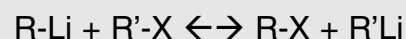
d. Halogen-Metal exchange

The Halogen metal-exchange reaction was discovered in the late 1930th by Gilman³⁷ and Wittig³⁸. The reaction is often used to prepare vinyl- and aryl-lithium compounds from the more reactive alkyl-lithium species³⁹.

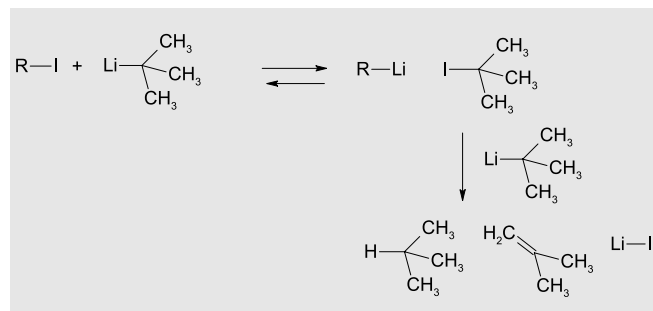


A sequence of halogen-metal exchanges - stannylation - Stille coupling reactions with pyridines has been used for the synthesis of oligo-pyridine ligands⁴⁰.

The halogen-metal exchange between aliphatic substrates is less common and has experimental limitations due to the fact, that the reaction is most often an equilibrium:



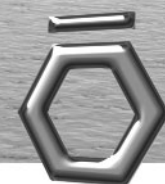
and also side reactions like eliminations, couplings and α -metallations are possible. Useful halogen-metal-exchange reactions between aliphatic substrates can be achieved by shifting the equilibrium to the product side. Here tert-butyllithium plays a prominent role as reagent. By addition of a second equivalent tert-butyllithium the resulting tert-butyliodide is removed instantly from the equilibrium⁴¹.



Literature References:

- 35 B.Goldfuss, M.Steigelmann, F.Romiger, *Angew.Chem.* **2000** 112 4299 and Lit. 19
36 D. Seebach and A.Hidber, *Organic Syntheses, Coll.Vol.* **7**, 447
37 H.Gilman, W.Langham, A.L.Jacoby, *J.Am.Chem.Soc.* **1939**, **61**, 106.
38 G.Wittig, U.Pockels, *Chem.Ber.* **1938**, **71**, 1903.

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40 U.S.Schubert, Ch.Eschbaumer, *Org.Lett.* **1999** 1 1027.
41 W.F.Bailey, E.R.Punzalan, *J.Org.Chem.* **55** 5404 (1990)



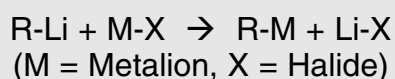
The halogen-metal exchange is preferably done with iodides or bromides, while chlorides are less common. Addition of an ethereal solvent helps to remove excess of tert-butyllithium because it reacts with this solvent at higher temperature.

Products available from Acros Organics

tert-butyllithium 1,5 M in Pentane . . . 18128

e. Transmetalation

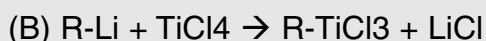
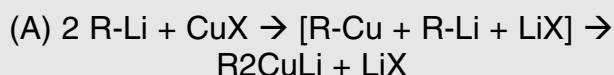
The organolithium compounds are very often used to prepare other metallorganic compounds through the transmetalation reaction:



Products available from Acros Organics

CeCl ₃ anhydrous	36975
CuI, 99,995%	20150
CuI 98%	19490
CuCN 99%	20208
TiCl ₄ 99,9%	19723
Ti(OiPr) ₄ 98%	19470
ZnCl ₂ 0,5M in THF	37006
ZnCl ₂ 1M in Et ₂ O	37005

This reaction has been used to prepare the important organo-copper^{42,43,44} (A) and organo-titanium⁴⁵ (B) and many other metallorganic compounds⁴⁶ which have often higher selectivity than the organolithium compounds.

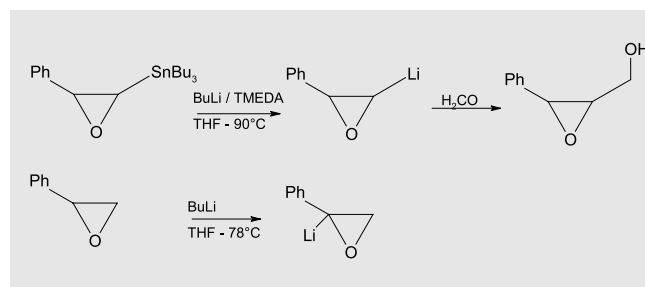


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- 42 E. Erdik 1984, 40, 641; J.Lindley, Tetrahedron 1984, 40, 1433; B. H. Lipshutz, Sengupta, S. Org. React. 1992, 41, 135; Y. Yamamoto, Angew.Chem.Int.Ed. 1986, 25, 947; B. H. Lipshutz Synthesis 1987, 325; Marshall, J. A. Chem. Rev. 1989, 89, 1503; E.Nakamura, Synlett 1991, 539; Ibuka, T.; Yamamoto, Y. Synlett 1992, 769; Wipf, P. Synthesis 1993, 537; Krause, N.; Gerold, A. Angew. Chem. Int. Ed. Engl. 1997, 36, 187-204.
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- 44 J.F.Normant, Synthesis 1972 63.

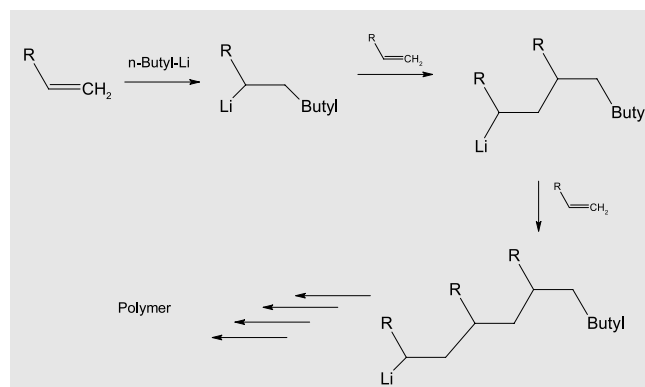
Highly functionalized mixed cuprates have been synthesized recently by halogen-metal exchange of sterically hindered alkylhalogenides with tert-butyllithium and subsequent transmetalation to the cuprate followed by a second halogen-metal-exchange⁴⁷.

An example of transmetalation to prepare complex and sensitive organolithium reagents is the following reaction, which gives the β-lithio-styreneoxide, whereas the direct metalation yields the α-isomer⁴⁹.



f. Anionic Polymerisation

A major industrial use of alkyllithium compounds, specifically n-Butyllithium, is the catalysis of the anionic polymerization of butadiene⁵⁰, isoprene and styrene.



45 M.T.Reetz, Titanium in Organic Synthesis in Organometallics in Synthesis, M.Schlösser (Ed.) John Wiley & Sons 1994.

46 Manganese: Organic Syntheses, CV 9, 328; Organic Syntheses, Vol. 76, 239; Zinc: Organic Syntheses, CV 8, 430; Cerium: T.Imamoto, Pure&Appl.Chem. 1990 747; V .Nair, J.Mathew, Chem. Soc. Rev. 1997, 26, 127.

47 C.Piazza, P.Knochel, Angew.Chem.Int.Ed. 2002, 41, 3263.

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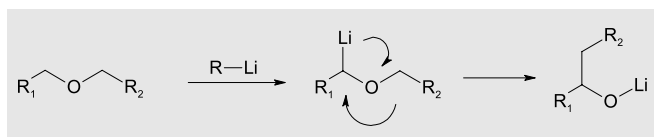
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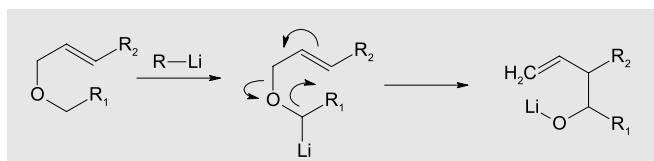


IV. Named organic reactions with organolithium compounds

a. [1,2] and [2,3]-Wittig rearrangement



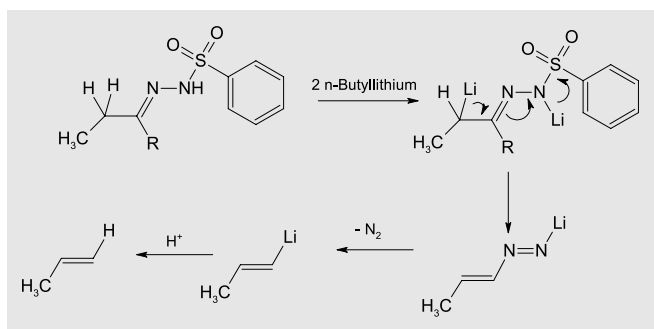
The [1,2] Wittig-rearrangement of ethers with alkyl lithiums to yield alcohols via a [1,2]-shift⁵¹. Usually a strong base like phenyllithium is used. The groups R₁ and R₂ may be alkyl, aryl or vinyl. The facility of migration follows the order allyl > benzyl > ethyl > methyl > phenyl⁵².



The [2,3]-Wittig rearrangement⁵³ is a sigma-tropic rearrangement of a α -deprotonated allylether.

b. Shapiro Olefination⁵⁴

The Shapiro Olefination is a decomposition of a p-tosylhydrazone with two equivalents of a strong base (usually methyllithium). The reaction is used to produce the olefins or vinyl lithium-compounds.



Literature References:

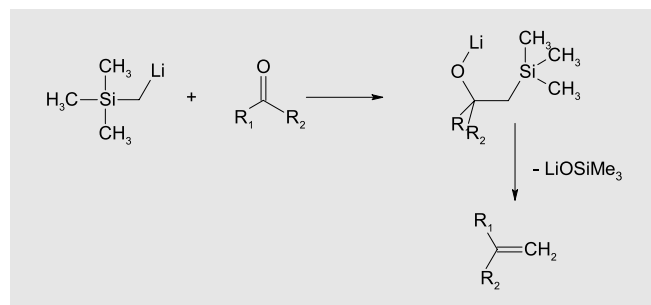
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Products available from Acros Organics

p-Toluenesulfonylhydrazine 15786

c. Peterson Olefination⁵⁵

The Peterson Olefination is the addition of a α -silylcarbanion to a carbonyl-compound which yields after elimination of Lithiumtrimethylsilanoate the olefine.

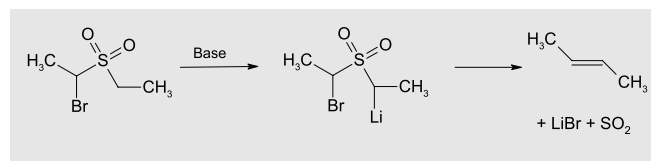


Products available from Acros Organics

(Trimethylsilyl)methyl lithium,
1 M in Pentane 37745
(Trimethylsilyl)methyl magnesium
bromide, 1 M in Diethylether 37746

d. Ramberg-Bäcklund-Reaction⁵⁶

In this reaction is a α -Halogen sulfone is treated with a strong base to give an olefine.



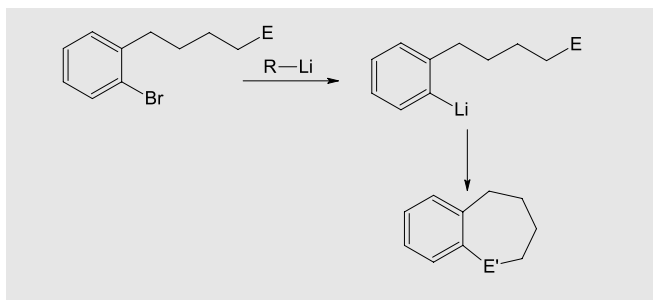
- 54 R. H. Shapiro, M. J. Heath, J. Am. Chem. Soc. 89, 5734 (1967).
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56 L. A. Paquette, Accts. Chem. Res. 1, 209-216 (1968);



e. Parham Cyclization⁵⁷

The Parham cyclisation is an example for a halogen-metal exchange on an aromatic ring followed by a ring-closure reaction with the electrophile as part of a side chain.

E can be CH₂-Br, CH₂-Cl, Epoxide, Carbonyl etc.



Literature References:

57 W. E. Parham et al., J. Org. Chem. 40, 2394 (1975).

Natural or Silicon rubber sleeve septum stoppers

Special design for air-tight sealing of tubes, bottle necks and joints of laboratory glassware

Natural Rubber

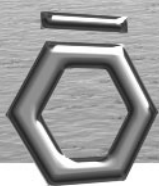


145821000	Septum 7mm (7.1mm real) natural rubber	100	EA
145831000	Septum 10mm (10.2mm real) natural rubber	100	EA
145841000	Septum 13mm (12.7mm real) natural rubber	100	EA
145851000	Septum 15mm (14.9mm real) natural rubber	100	EA
145861000	Septum 16mm (15.9mm real) natural rubber	100	EA
145871000	Septum 20mm (19.4mm real) natural rubber	100	EA
145880500	Septum 25mm (23.7mm real) natural rubber	50	EA
145890500	Septum 30mm (30.7mm real) natural rubber	50	EA

Silicone Rubber



145911000	Septum 7mm (7.1mm real), silicone rubber	100	EA
145921000	Septum 10mm (10.2mm real), silicone rubber	100	EA
145931000	Septum 13mm (12.7mm real), silicone rubber	100	EA
145941000	Septum 15mm (14.9mm real) silicone rubber	100	EA
145951000	Septum 16mm (15.9mm real), silicone rubber	100	EA
145961000	Septum 20mm (19.4mm real), silicone rubber	100	EA
145970500	Septum 25mm (23.7mm real), silicone rubber	50	EA
145980500	Septum 30mm (30.7mm real), silicone rubber	50	EA



VI. Indicators for the titration of organolithium compounds

Organolithium reagents are used almost always in solution. Knowing the exact content of reagent in the solvent is crucial for an exact dosage of the reagent.

Several methods have been developed to examine the titer of organolithium compounds.

The oldest method is the **Gilman double titration**.⁵⁸

Products available from Acros Organics

Benzylchloride, 99,5+%	18085
Methyl-orange-xylene-cyanol, solution in Water	41467
Hydrochloric acid, 1 N standard solution	12421
Hydrochloric acid, 0.1 N standard solution	12420

This method determines both the organolithium compounds and also the lithium-alcoholate content in solution. The latter can be produced if oxygen comes in contact with the organolithium product.

In the Gilman method the butyllithium is first derivatized with benzylchloride to neutral pentylbenzene leaving all other basic impurities unaffected. The reaction mixture is hydrolysed and titrated with a hydrochloric acid standard solution to a methyl-orange-xylene-cyanol end point. The result represents the amount of the basic impurities, which are not organolithiums.

A second aliquot of the organolithium solution is hydrolysed and titrated to give the total value for alkaline compounds.

Products available from Acros Organics

1,10-phenanthroline	15753
2,2'-biquinoline	10630
Toluene, extra dry	32698
2-Butanol, p.a.	22029

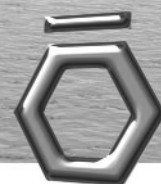
The **Watson-Eastham method** uses the fact, that organolithium compounds form coloured, stable charge-transfer (CT) complexes with indicators like 1,10-phenanthroline (green-yellow-CT-complex) or 2,2'-biquinoline (red-brown CT complex) in dry toluene solution. The titration uses 2-butanol in dry toluene as titrant. The CT complex is only destroyed when all unreacted organolithium compound is already reacted with the alcohol, then at the end-point the solution decolourises.

Substances, which form coloured mono-anions with organolithium compounds, can be used also as indicators. The metallorganic base is added to an excess of the indicator, which forms the coloured anion. Titration with an alcohol in a dry solvent until the colour disappears shows the end point. An example is α -Methylstyrene, which forms a red adduct with n-Butyllithium, which can be titrated with n-Butanol.

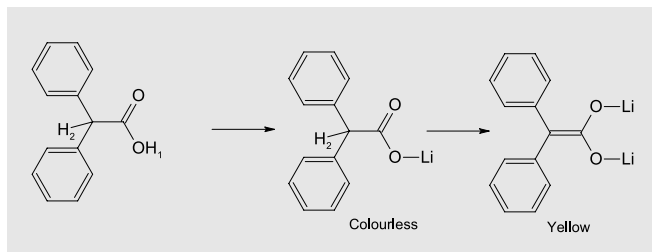
Products available from Acros Organics

α -Methylstyrene	12771
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One very common, simple and fast method uses the fact the some compounds form very deeply coloured di-anions after double deprotonation with organolithium compounds. Usually the (dry!) indicator is weighed exactly and dissolved in dry THF. Then the organolithium-solution is added directly by a syringe until the color of the end point appears.



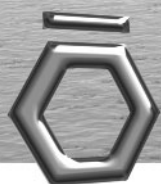
An example is diphenylacetic acid. The first equivalent of base is used to deprotonate H1, the resulting carboxylate-ion is colourless. Only when H2 is also deprotonated the intensive yellow colour of the di-anion appears.



Similar reagents are N-Pivaloyl-O-toluidine and N-Pivaloyl-O-benzylaniline⁵⁹, two crystalline, non-hygroscopic and stable compounds which form intensive yellow and yellow-orange dianions.

**Products available from
Acros Organics**

Diphenylacetic acid	11715
N-Pivaloyl-O-toluidine	34673
N-Pivaloyl-O-benzylaniline	34674



V. Organolithium compounds available at Acros Organics

ORGANOMETALLICS	FORMULATION	PRODUCT NO	AVAILABLE PACKSIZE
n-Butyllithium	1.6 M solution in hexanes	18127	100ml 800ml
n-Butyllithium	2.5 M solution in hexanes	21335	100ml 800ml
n-Butyllithium	2.2 M solution in cyclohexane	37749	100ml 800ml
n-Butyllithium	2.6 M solution in toluene	37893	100ml 800ml
iso-Butyllithium	1.6 M solution in heptane	37759	100ml 800ml
sec-Butyllithium	1.3 M solution in cyclohexane/hexane (92/8)	18754	100ml 800ml
tert-Butyllithium	1.5 M solution in pentane	18128	100ml 800ml
Ethyllithium	1.7 M solution in dibutyl ether	37757	100ml 800ml
n-Hexyllithium	2.3 M solution in n-hexane	30165	100ml 800ml
Lithium acetylide, ethylenediamine complex	powder 85%	18125	50g 100g
Lithium amide	powder 95%	19986	5g 100g 500g
Lithium bis(trimethylsilyl)amide	powder 95%	33814	10g
Lithium bis(trimethylsilyl)amide	1.0 M solution in THF	34770	100ml 800ml
Lithium bis(trimethylsilyl)amide	1.0 M solution in methyl tert-butyl ether	34567	100ml 800ml
Lithium bis(trimethylsilyl)amide	1.3 M solution in toluene/ethylbenzene	37748	100ml 800ml
Lithium bis(trimethylsilyl)amide	1.3 M solution in hexanes/ethylbenzene	37747	100ml 800ml
Lithium tert-butoxide	powder 95%	30122	available soon
Lithium tert-butoxide	1.0 M solution in hexanes	38015	available soon
Lithium tert-butoxide	2.2 M solution in THF	38016	available soon
Lithium cyclopentadienide	powder 97%	31658	5g
Lithium diisopropylamide	2.0 M solution in heptane/THF/ethylbenzene	26883	100ml 800ml
Lithium ethoxide	1.0 M solution in ethanol	38017	available soon
Lithium ethoxide	1.0 M solution in THF	38018	available soon
Lithium hydride	powder 98%	19119	10g 100g 500g
Lithium isopropoxide	powder 95%	30124	available soon
Lithium isopropoxide	2.0 M solution in THF	38019	available soon
Lithium isopropoxide	1.0 M solution in hexanes	38020	available soon
Lithium methoxide	powder 98%	30123	available soon
Lithium methoxide	2.0 M solution in methanol	33675	100ml 800ml
Lithium pentamethylcyclopentadienide	powder 98%	35324	1g 5g
Methylithium	1.6 M solution in diethyl ether	18875	100ml 800ml
Methylithium, as complex with lithium bromide	2.2 M solution in diethyl ether	18129	100ml 800ml
Phenyllithium	2.0 M solution in dibutyl ether	36515	100ml 500ml
(Trimethylsilylmethyl)lithium	1.0 M solution in hexanes	37745	available soon

DRY SOLVENTS



QUALITY DRY SOLVENTS IN TWO FORMATS

- › Highest Quality extra dry solvents (down to 10 ppm water content), filtered over 0.2 micron PTFE filter for the demanding chemist.
- › Quality dry solvents (down to 50 ppm water content), stored over 3 Å molecular sieve for daily use.

HIGHEST QUALITY EXTRA DRY SOLVENTS (DOWN TO 10 PPM WATER), FILTERED OVER 0.2 MICRON PTFE FILTER

Product name	Code 100ml	Code 1l	Code 2.5l
Acetone, extra dry, water < 50 ppm	326801000	326800010	
Acetonitrile, extra dry, water < 10 ppm	326811000	326810010	
Chloroform, extra dry, water < 50 ppm, stabilized	326821000	326820010	
Cyclohexane, extra dry, water < 50 ppm	326831000		
1,2-Dichloroethane, extra dry, water < 50 ppm	326841000	326840010	
Dichloromethane, extra dry, water < 30 ppm, stabilized	326851000	326850010	326850025
Dimethylformamide, extra dry, water < 50 ppm	326871000	326870010	326870025
1,4-Dioxane, extra dry, water < 50 ppm, stabilized	326891000	326890010	
Ether, extra dry, water < 50 ppm, stabilized	326861000	326860010	
Ethyl acetate, extra dry, water < 50 ppm	326901000		
n-Heptane, extra dry, water < 30 ppm	326911000		
n-Hexane, extra dry, water < 20 ppm	326921000	326920010	
Isopropanol, extra dry, water < 50 ppm	326961000	326960010	
Methyl alcohol, extra dry, water < 50 ppm	326951000	326950010	
1-Methyl-2-pyrrolidinone, extra dry, water < 50 ppm	326931000	326930010	
Methyl sulfoxide, extra dry, water < 50 ppm	326881000	326880010	
Pyridine, extra dry, water < 50ppm	339421000	339420010	
Tetrahydrofuran, extra dry, water < 50 ppm, stabilized	326971000	326970010	326970025
Toluene, extra dry, water < 30 ppm	326981000	326980010	
2,2,4-Trimethylpentane, extra dry, water < 30 ppm	326941000		



AcroSeal bottles are individually packaged in sealed aluminium bags for longer shelf life.

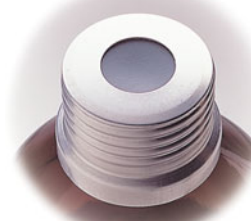
White graduations on amber bottle provide a useful way to track solvent use.

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Product name	Code 100ml	Code 1l	Code 2.5l
Acetonitrile, extra dry < 50 ppm	364311000	364310010	
Chloroform, extra dry < 50 ppm, stabilized	364321000	364320010	
Dichloromethane, extra dry, water < 50 ppm, stabilized	348461000	348460010	348460025
N,N-Dimethylformamide, extra dry, water < 50 ppm	348431000	348430010	348430025
1,4-Dioxane, extra dry < 50 ppm, stabilized	364341000	364340010	
Ether, extra dry < 50 ppm, stabilized	364331000	364330010	
Ethyl acetate, extra dry < 50 ppm	364351000	364350010	
n-Heptane, extra dry < 50 ppm	364361000	364360010	
n-Hexane, extra dry < 50 ppm	364371000	364370010	
Isopropanol, extra dry < 50 ppm	364401000	364400010	
Methyl alcohol, extra dry < 50 ppm	364391000	364390010	
1-Methyl-2-pyrrolidinone, extra dry < 50 ppm	364381000	364380010	
Methylsulfoxide, extra dry, water < 50 ppm	348441000	348440010	348440025
Pyridine, extra dry < 50 ppm	364421000	364420010	
Tetrahydrofuran, extra dry, water < 50 ppm, stabilized	348451000	348450010	348450025
Toluene, extra dry < 50 ppm	364411000	364410010	



Clearly marked label identifies product, assay, water content, and physical properties.



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