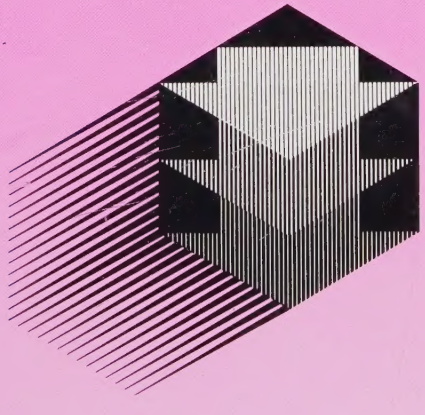
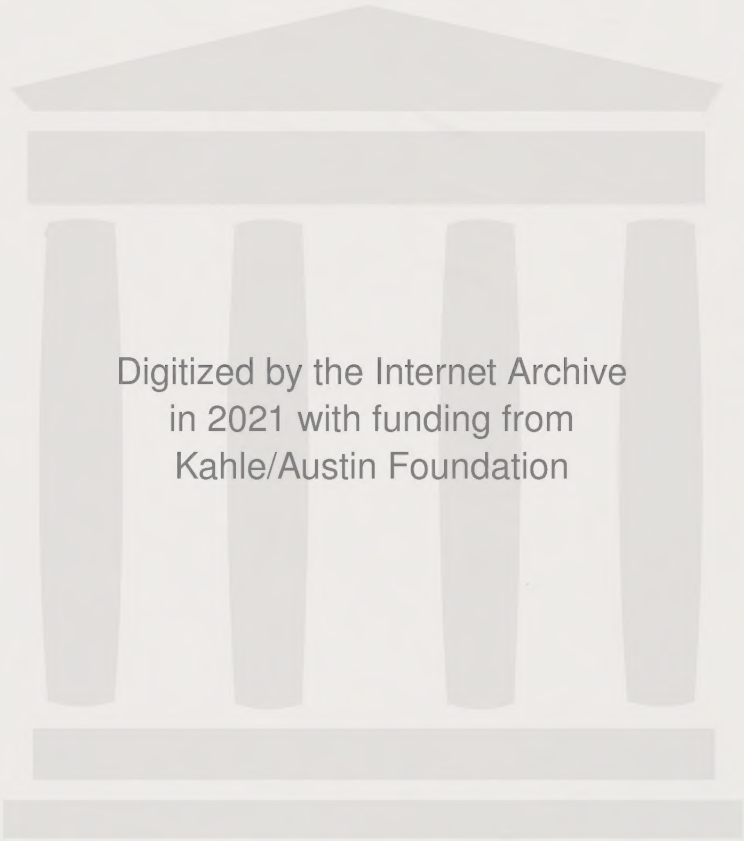
100 MODERN REAGENTS



Edited by N.S. Simpkins



100 Modern Reagents

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Editor: N. S. Simpkins

The Royal Society of Chemistry

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Foreword

One of the primary requirements of modern organic synthesis is the highly selective chemical transformation of complex molecules to desirable target compounds. The difficulties in efficiently conducting such selective reactions have resulted in the development of such a vast armoury of reagents that it is ever more difficult to find the ideal reagent for a particular problem. The need for a lab companion that could act both as a source-book, and as a point of access to the primary literature, has resulted in this book, *100 Modern Reagents*.

The book brings together a selection of 100 important reagents which have found significant application in organic synthesis. *100 Modern Reagents* features both well-known and less-familiar reagents which have been identified in *Methods in Organic Synthesis* during the last five years. The selection reflects reagents which have found widespread use, with emphasis on those which conduct important transformations, or which show interesting and varied reactivity.

Chemical and physical data are provided for each reagent, along with up-to-date information on safety precautions, literature preparations or commercial availability. Each page of data is accompanied by a page of reaction schemes illustrating recent applications of the particular reagent, along with literature references. *100 Modern Reagents* will prove invaluable to practising synthetic chemists in both industry and academia, who are looking for new reagents in synthesis or new uses for more familiar ones.

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Sources

CAS registry numbers, CAS names, physical data, safety and handling information (including flash point (Fp) figures) and brief details on reactions, reviews and preparations were compiled with the aid of the texts listed below.[1-5]

Additional data and details on availability were also obtained from catalogues of chemical suppliers[6-9] and have been presented in the form: Supplier, state, purity and cost. The cost is given as p, £, ££, or ££, indicating a price per gram of less than 50p, 50p-£1.50, £1.50-£5.00, and more than £5.00, respectively, in order to allow general comparisons to be made.

1. *Chemical Abstracts.*

2. *Handbook of Chemistry and Physics,* 60th edn,
ed. R. C. Weast, CRC Press, Boca Raton, Florida, 1979-1980.

3. *Hazards in the Chemical Laboratory,* 3rd edn,
ed. L. Bretherick, RSC, London, 1981.

4. *Chemical Safety Data Sheets, Vol. 1: Solvents,* RSC, London, 1989.

5. *Advanced Organic Chemistry,* 2nd edn,
J. March, McGraw International, Japan, 1983.

6. Aldrich Chemical Co. Ltd, Catalogue 1988-1989.

7. Johnson Matthey Chemicals, Catalogue 1986-1987.

8. Lancaster Synthesis Ltd, Catalogue 1989-1990.

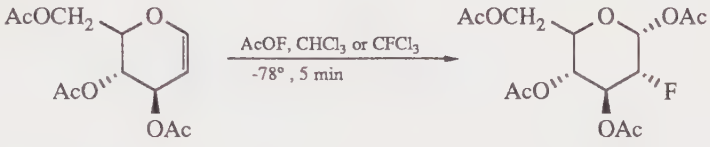
9. Sigma Chemical Co. Ltd, Catalogue, 1989.

1. Acetyl hypofluorite

CAS Registry Number	78948-09-1
CAS Name	Acetic acid, anhydride with hypofluorous acid
Molecular Formula	AcOF
Molecular Weight	78
Boiling Point	Not available.
Melting Point	-96°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Limited stability in liquid state. May explode. See *Chem. Eng. News*, 1985, **63**(*7*), 2. Vapour has 2 h half-life at room temp. Physical properties discussed, see *J. Am. Chem. Soc.*, 1985, **107**(*23*), 6515-6518.
Reactions	Fluorination. Oxygenation.
Availability	Not commercially available.
Preparation	Prepared by bubbling F_2 through suspensions of NaF, NaOAc or NaO_2CCF_3 in 1:9 AcOH:$CFCl_3$. See S. Rozen *et al.*, *J. Chem. Soc., Chem. Commun.*, 1981, (*10*), 443-444.
Other Preparations	Also prepared by passage of 5% v/v F_2-O_2 through solid KOAc.2HOAc and trapped as slightly yellow liquid at -78°. See also: *Synth. Commun.*, 1984, **14**(*1*), 45; *Carbohydrates*, 1984, **24**(*4*), 477-484; *J. Fluor. Chem.*, 1984, (*24*), 477.

Stereoselective fluorination of carbohydrates

M. J. Adam*, B. D. Pate, J.-R. Nesser, L. D. Hall, *Carbohydr. Res.*, 1983, **124**(*2*), 215-224

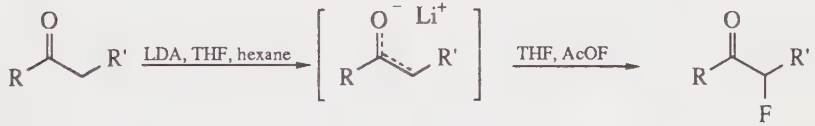


78 %

6 examples

Direct fluorination of lithium enolates with acetyl hypofluorite

S. Rozen*, M. Brand, *Synthesis*, 1985, (*6/7*), 665-667



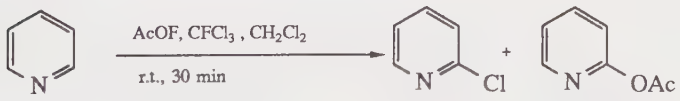
R, R' = alkyl, aryl

37 - 86 %

6 examples

Chlorination, bromination and oxygenation of pyridines with acetyl hypofluorite

S. Rozen*, D. Heber, *J. Org. Chem.*, 1988, **53**(*5*), 1123-1125



70 %

15 %

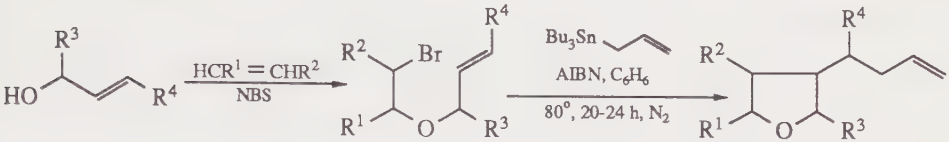
8 examples

2. Allyltributyltin

CAS Registry Number	24850-33-7
CAS Name	Stannane, tributyl-2-propenyl-
Molecular Formula	$[Me(CH_2)_3]_3SnCH_2CH{=}CH_2$
Molecular Weight	331.11
Boiling Point	88-92°C/0.2 mmHg
Melting Point	Not available.
Density	1.068 kg/m^3
Refractive Index	1.4846
Safety and Handling	Irritant. Fp 110°C
Reactions	Allylation. Reviews: *Chem. Rev.*, 1960, 459; *Chem. Ind. (London)*, 1972, 490; *Aldrichim. Acta*, 1987, **20**(2), 45-49.
Availability	Aldrich: 97%, £££.

Alkenyl-substituted tetrahydrofurans via successive intra- and intermolecular radical reactions

O. Moriya*, M. Kakihana, Y. Urata, T. Sugizaki, T. Kageyama, Y. Ueno, T. Endo, *J. Chem. Soc., Chem. Commun.*, 1985, (*20*), 1401-1402

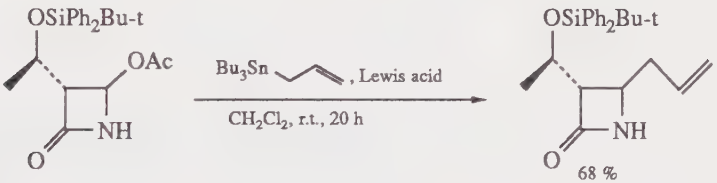


R^1 = alkyl, aryl R^2 = H, CH_2OH 40 -70 % 6 examples 25 - 49 %

R^1 R^2= cycloalkyl R^3, R^4= H, Me

Preparation of allylazetidinones and methylallylazetidinones

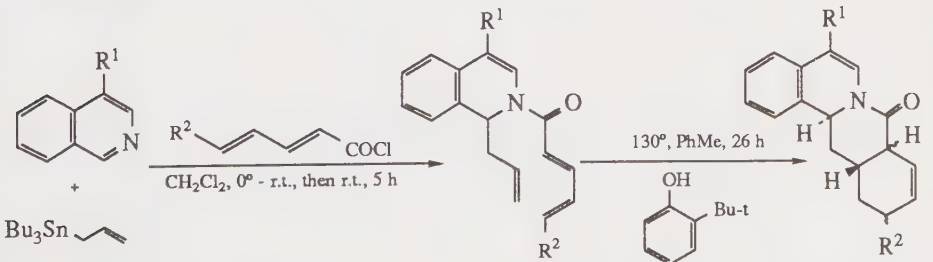
H. Fliri*, C.-P. Mak*, *J. Org. Chem.*, 1985, **50**(*19*), 3438-3442



68 %
5 examples

Organotin reactions with isoquinolines. Dibenzoquinolizinone synthesis

R. Yamaguchi*, A. Otsuji, K. Utimoto, *J. Am. Chem. Soc.*, 1988, **110**(*7*), 2186-2187



68 - 94 %
6 examples

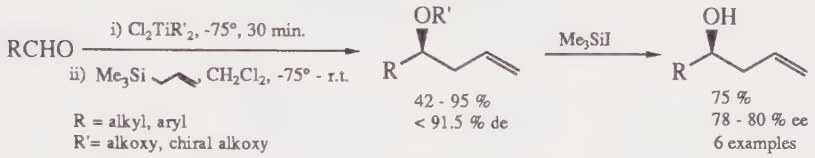
76 - 84 %
4 examples

3. Allyltrimethylsilane

CAS Registry Number	762-72-1
CAS Name	Silane, trimethyl-2-propenyl-
Molecular Formula	$H_2C{=}CHCH_2SiMe_3$
Molecular Weight	114.27
Boiling Point	85°C / 737 mm Hg
Melting Point	Not available.
Density	0.719 kg/m^3
Refractive Index	1.4056
Safety and Handling	Highly flammable. Irritant.
Reactions	Allylation. Alkylation. Reviews: *Pure Appl. Chem.*, 1982, **54**, 1; *Acc. Chem. Res.*, 1988, **21**(5), 200-206.
Availability	Aldrich: 99%, £. Lancaster Synthesis: 99+%, £, bulk prices available. Sigma: £.

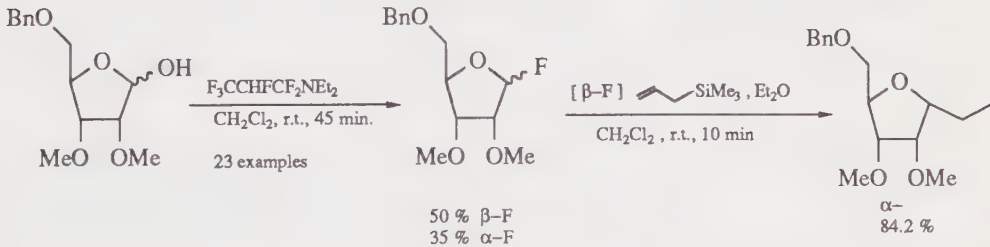
Alkylation of aldehydes with etherification by dialkoxydichlorotitanium-allyltrimethylsilane. An asymmetric variation of the Sakurai reaction

R. Imwinkel, D. Seebach*, *Angew. Chem. (Int. Ed. Engl.)*, 1985, **24**(*9*), 765-766



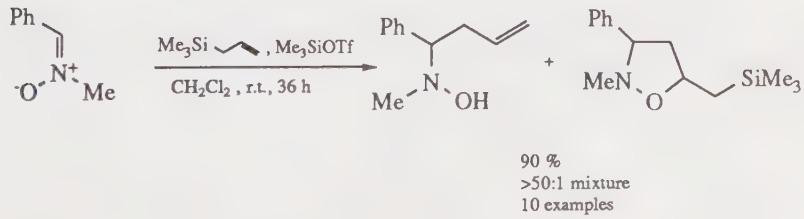
Stereoselective ribofuranosylation. Reaction of ribofuranosyl fluorides with silyl enol ethers and allyltrimethylsilane

Y. Araki, N. Kobayashi, Y. Ishido, J. Nagasawa, *Carbohydr. Res.*, 1987, **171**, 125-139



Trimethylsilyl triflate-catalyzed addition of allylsilanes to nitrones

P. G. M. Wutts*, Y.-W. Jung, *J. Org. Chem.*, 1988, **53**(*9*), 1957-1965

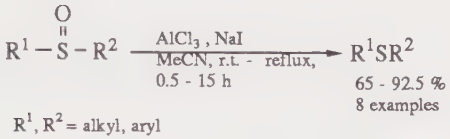


4. Aluminium chloride

CAS Registry Number	7446-70-0, 7784-13-6 (hexahydrate)
CAS Name	Aluminum chloride ($AlCl_3$)
Molecular Formula	$AlCl_3$
Molecular Weight	133.34, 241.43 (hexahydrate)
Boiling Point	Not available.
Melting Point	190°C (2.5 atm), 100°C(dec.) (hexahydrate)
Density	2.44 kg/m^3, 2.398 kg/m^3 (hexahydrate)
Refractive Index	1.6 (hexahydrate)
Safety and Handling	Corrosive. Irritant. Violently decomposed by water.
Reactions	Reduction. Lewis acid catalyst. Friedel-Crafts catalyst. Ring enlargement.
Availability	Aldrich: anhydrous, powder and granules, 99.99%, p; anhydrous, 99%, p; anhydrous, p; 1M in nitrobenzene, under N_2 in Sure/Seal™, £; hexahydrate, 99.99%, £; hexahydrate, 99%, £. Johnson Matthey: hexahydrate, crystalline, Spec-pure®, p; hydrate, 97% p; anhydrous, p. Sigma: hexahydrate, p.

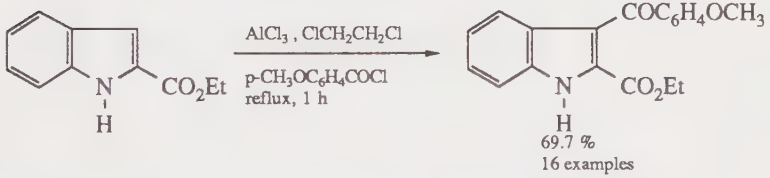
Facile reduction of sulphoxides to sulphides using an aluminium chloride-sodium iodide system

M. V. Bhatt*, J. R. Babu, *Indian J. Chem., Sect. B*, 1988, **27**(*3*), 259-260



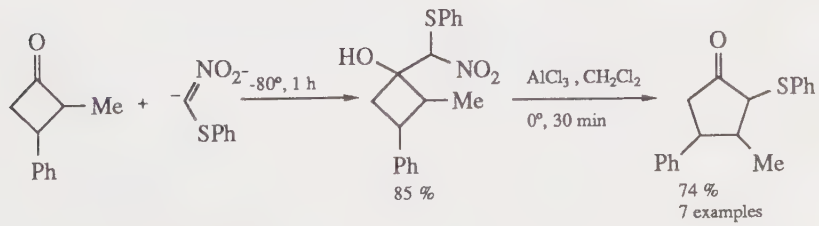
Regioselective Friedel-Crafts acylation of ethyl indole-2-carboxylate with acyl chlorides or acid anhydrides

Y. Murakami*, M. Tani, K. Tanaka, Y. Yokoyama, *Chem. Pharm. Bull.*, 1988, **36**(*6*), 2023-2035



Ring expansion of cyclic ketones to α-phenylthio ketones

S. Kim*, J. H. Park, *Chem. Lett.*, 1988, (*8*), 1323-1324

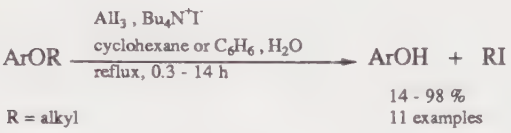


5. Aluminium iodide

CAS Registry Number	7784-23-8
CAS Name	Aluminum iodide (AlI_3)
Molecular Formula	AlI_3
Molecular Weight	407.70, 515.79 (hexahydrate)
Boiling Point	360°C
Melting Point	191°C, 185°C (dec.) (hexahydrate)
Density	3.980 kg/m^3
Refractive Index	Not available.
Safety and Handling	Corrosive. Moisture sensitive.
Reactions	Reduction. Halide exchange. Ether cleavage.
Availability	Aldrich: anhydrous, 95%, £.

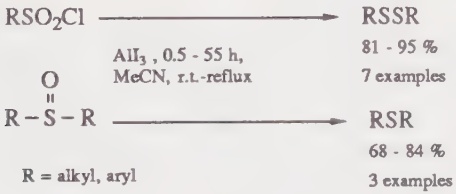
An improvement of the aluminium iodide method for ether cleavage: catalysis by quaternary ammonium iodides

S. Andersson, *Synthesis*, 1985, (*4*), 437-439



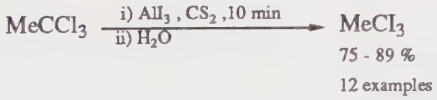
Reduction of sulphonyl chlorides and sulphoxides with aluminium iodide

J. R. Babu, M. V. Bhatt*, *Tetrahedron Lett.*, 1986, **27**(*9*), 1073-1074



Preparation of alkyl iodides from alkyl chlorides using aluminium triiodide

F. J. Arnaiz, J. M. Bustillo, *An. Quim., Ser. C.*, 1986, **82**(*3*), 270-271

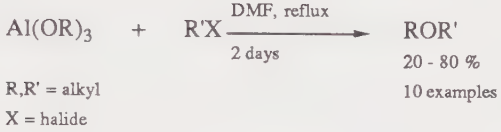


6. Aluminium isopropoxide

CAS Registry Number	555-31-7
CAS Name	2-Propanol, aluminum salt
Molecular Formula	$(Me_2CHO)_3Al$
Molecular Weight	204.25
Boiling Point	140.5°C
Melting Point	138-142°C (99.99+%), 118°C (98+%)
Density	1.035 kg/m^3
Refractive Index	Not available.
Safety and Handling	Corrosive. Moisture sensitive. Flammable. Irritant.
Reactions	Reduction of carbonyl compounds. Ring cleavage. Reviews: *Org. React.*, 1944, **2**, 178; *Org. React.*, 1951, **6**, 207.
Suppliers	Aldrich: 99.99+% (purity based on metals analysis), £; 98+%, p. Lancaster Synthesis: 98+%, p. Sigma: p.

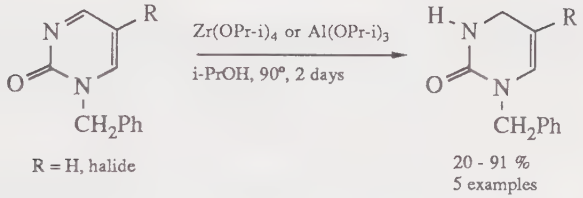
Preparation of ethers from aluminium alkoxides and alkyl halides in DMF

L. Lompa-Krzymien, L. C. Leitch, *Polish J. Chem.*, 1983, **57**(*4-6*), 629-630



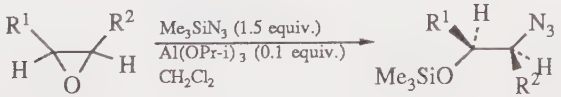
Regioselective reduction of pyrimidinones with zirconium or aluminium isopropoxides

T. Hoseggen, F. Rise, K. Undheim*, *J. Chem. Soc., Perkin Trans. 1*, 1986, (*5*), 849-850



Regio- and chemoselective ring opening of epoxides with trimethylsilyl azide/aluminium isopropoxide

M. Emziane, P. Lhoste, D. Sinou*, *Synthesis*, 1988, (*7*), 541-544

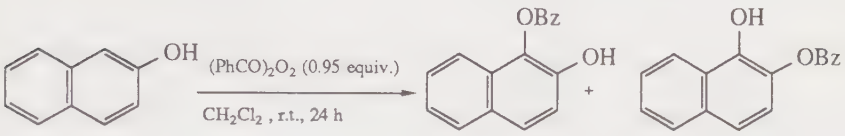


7. Benzoyl peroxide

CAS Registry Number	94-36-0
CAS Name	Peroxide, dibenzoyl
Molecular Formula	$(PhCO)_2O_2$
Molecular Weight	242.23
Boiling Point	Not available.
Melting Point	104-106°C (dec.) (97%), 105°C (70%)
Density	Not available.
Refractive Index	1.545
Safety and Handling	Oxidizer. Irritating to eyes, skin and respiratory system. Found to have skin tumour promoting activity: *Science*, 1981, **213**, 1023. Extreme risk of explosion by shock, friction, fire or other source of ignition.
Reactions	Initiator. Curing agent. Cross-linking agent. Oxidation. Benzoylation.
Availability	Aldrich: 97%, p; 70% (remainder water), p.

Oxidation of naphthols with benzoyl peroxide

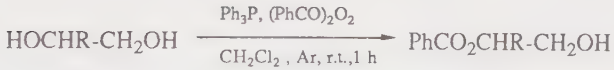
T. Matsumoto*, S. Imai*, N. Yamamoto, *Bull. Chem. Soc. Jpn.*, 1988, **61**(*3*), 911-919



52 %
4 examples

Regioselective benzoylation of α-glycols

A. M. Pautard, S. A. Evans, Jr.*, *J. Org. Chem.*, 1988, **53**(*10*), 2300-2303

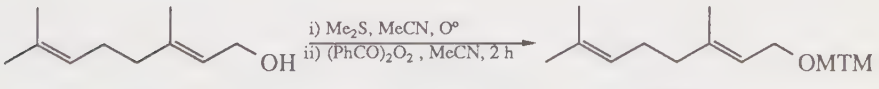


R = Me, Ph

80 %

Conversion of alcohols to methylthiomethyl ethers

J. C. Medina, M. Salomon, K. S. Kyler*, *Tetrahedron Lett.*, 1988, **29**(*31*), 3773-3776



MTM = methylthiomethyl

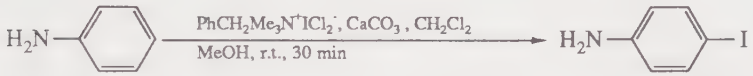
88 %
10 examples

8. Benzyltrimethylammonium dichloroiodate

CAS Registry Number	114971-52-7
CAS Name	Benzenemethanaminium, *N,N,N*-trimethyl-, dichloroiodate(1-)
Molecular Formula	$PhCH_2NMe_3ICl_2$
Molecular Weight	348.05
Boiling Point	Not available.
Melting Point	125°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Iodination. Chlorination.
Availability	Not commercially available.
Preparation	Prepared by reaction of ICl in CH_2Cl_2 and $PhCH_2NMe_3Cl$ in H_2O at room temp. as stable brilliant yellow needles: *Chem. Lett.*, 1987, 2109; *Bull. Chem. Soc. Japan*, 1988, **61**, 600-602.
Other Preparations	*Chem. Lett.*, 1988, 795-798.

Bromination and iodination of aryl amines with benzyltrimethylammonium tribromide and dichloroiodate

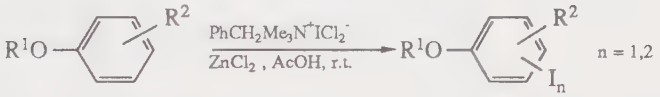
S. Kajigaeshi*, T. Kakinami, K. Inoue, M. Kondo, H. Nakamura, M. Fujikawa, T. Okamoto, *Bull. Chem. Soc. Jpn.*, 1988, **61**(2), 597-599, 600-602



94 %
25 examples

Iodination of aromatic ethers

S. Kajigaeshi*, T. Kakinami, M. Moriwaki, M. Watanabe, S. Fujisaki, T. Okamoto, *Chem. Lett.*, 1988, (5), 795-798

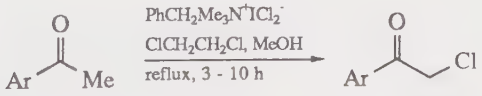


R^1, R^2 = alkyl, aryl, H

87 - 98 %
20 examples

α-Chlorination of aromatic acetyl derivatives

S. Kajigaeshi*, T. Kakinami, M. Moriwaki, S. Fujisaki, K. Maeno, T. Okamoto, *Synthesis*, 1988, (7), 545-546



Ar = Ph, substit. Ph, 2-napthyl
2-thienyl

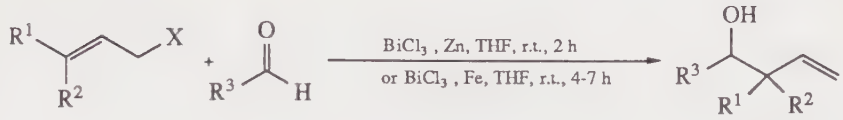
66 - 99 %
13 examples

9. Bismuth(III) chloride

CAS Registry Number	7787-60-2
CAS Name	Bismuthine, trichloro-
Molecular Formula	$BiCl_3$
Molecular Weight	315.34
Boiling Point	447°C
Melting Point	230-232°C
Density	4.750 kg/m^3
Refractive Index	Not available.
Safety and Handling	Corrosive. Moisture sensitive.
Reactions	Catalyst for allylation. Addition. Catalyst for aldol reaction.
Availability	Aldrich: 99.999%, £; anhydrous, 98+%, p. Johnson Matthey: 99.999%, ££; crystalline, Specpure®, £££; 98%, p.

Grignard-type addition of allyl halides to aldehydes

M. Wada, H. Ohki, K. Akiba*, *Tetrahedron Lett.*, 1986, **27**(*39*), 4771-4774

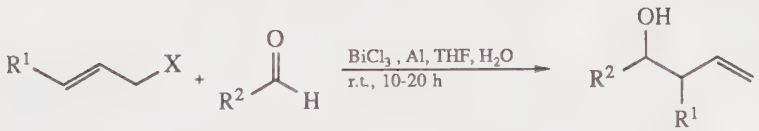


45 - 99 %
22 examples

R^1, R^2 = H, Me
R^3 = alkyl, aryl

Bismuth(III) chloride-aluminium promoted allylation of aldehydes to homoallyl alcohols

M. Wada*, H. Ohki, K. Akiba*, *J. Chem. Soc., Chem. Commun.*, 1987, (*10*), 708-709

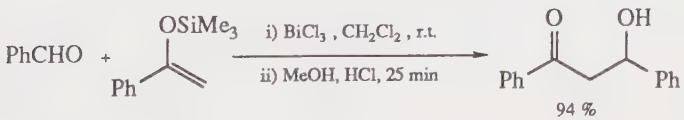


30 - 96 %
8 examples

R^1 = H, Me
R^2 = alkyl, aryl
X = Br, Cl

Bismuth trichloride as an efficient catalyst in the aldol reaction

H. Ohki, M. Wada*, K. Akiba*, *Tetrahedron Lett.*, 1988, **29**(*37*), 4719-4722



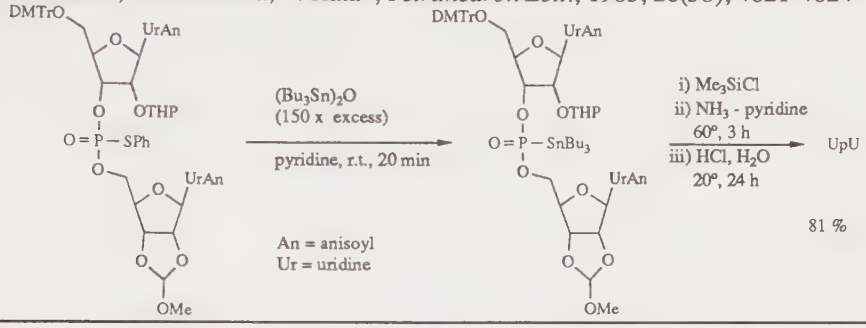
94 %
11 examples

10. Bis(tributyltin) oxide

CAS Registry Number	56-35-9
CAS Name	Distannoxane, hexabutyl-
Molecular Formula	$\{[Me(CH_2)_3]_3Sn\}_2O$
Molecular Weight	596.08
Boiling Point	180°C/2 mmHg
Melting Point	Not available.
Density	1.170 kg/m^3
Refractive Index	1.4864
Safety and Handling	Corrosive. Toxic. Keep cold.
Reactions	Oxidizing agent with bromine: *Tetrahedron Lett.*, 1977, 2413; 1978, 1277. Reviews: *Chem. Rev.*, 1960, 459; *Chem. Ind. (London)*, 1972, 490; *Synthesis*, 1969, 56.
Availability	Aldrich: 96%, p. Lancaster Synthesis: 96%, p, bulk prices available.

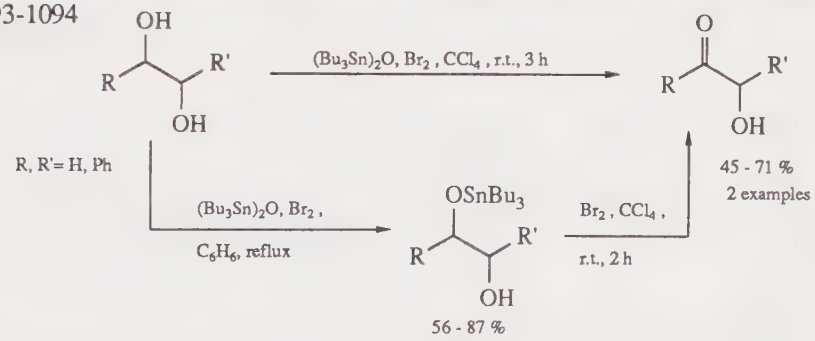
An effective method for removal of internucleotidic phenylthio groups from fully protected oligonucleotides

M. Sekine*, H. Tanimura, T. Hata*, *Tetrahedron Lett.*, 1985, **26**(*38*), 4621-4624



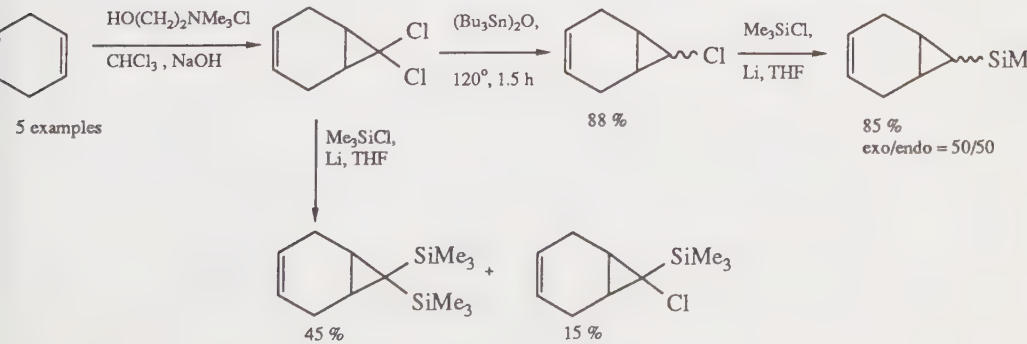
Oxidation of diols by bis(tributyltin) oxide and bromine

R. Ravindran, T. R. Balasubramanian*, *Indian J. Chem., Sect. B*, 1986, **25B**(*11*), 1093-1094



Synthesis of silylbicycloalkenes

M. Grignon-Dubois, J. Dunogues, M. Ahra, *Recl. Trav. Chim. Pays-Bas*, 1988, **107**(*3*), 216-225

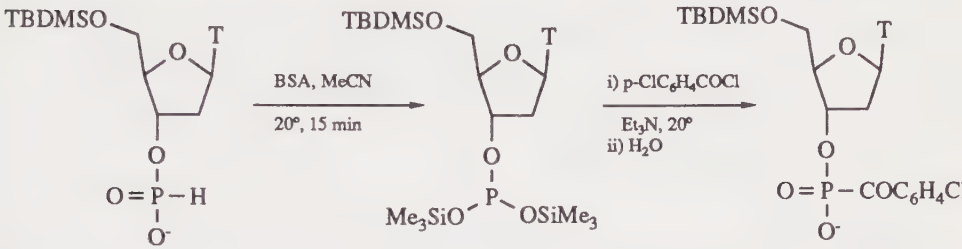


11. Bis(trimethylsilyl)acetamide (BSA)

CAS Registry Number	10416-59-8
CAS Name	Acetamide, *N*,*O*-bis(trimethylsilyl)-
Molecular Formula	$Me_3SiN{=}C(Me)OSiMe_3$
Molecular Weight	203.43
Boiling Point	71-73°C/35 mmHg
Melting Point	Not available.
Density	0.823 kg/m^3
Refractive Index	1.4170
Safety and Handling	Flammable liquid. Moisture sensitive. Irritant. Fp 11°C
Reactions	Silylating agent. Cyclocondensation. Review: *Synthesis*, 1985, 817.
Availability	Aldrich: p. Lancaster Synthesis: 98+%, p, bulk prices available. Sigma: p; sealed ampoules (1 ml ea.), ££.

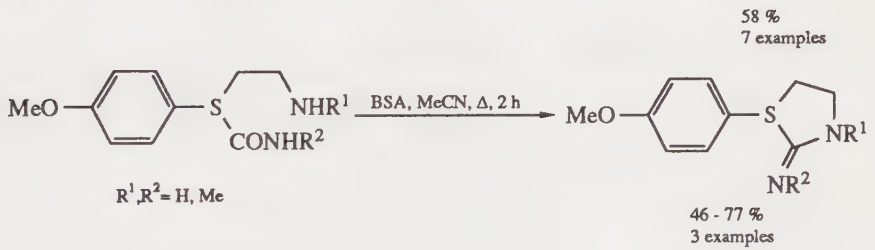
Conversion of H-phosphonate mono- or diesters of nucleic acids into phosphate di- or triesters

E. de Vroom, M. L. Spierenburg, C. E. Dreef, G. A. van der Marel, J. H. van Boom*, *Recl. Trav. Chim. Pays-Bas*, 1987, **106**(*2*), 65-66



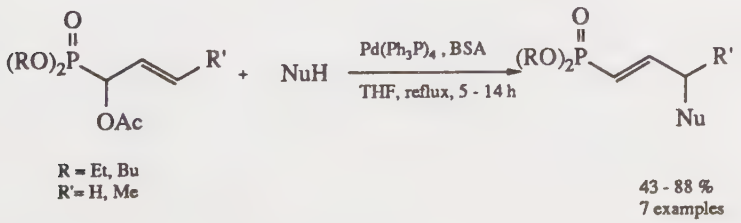
Preparation of cyclic amidines using BSA

K. Higashi, M. Sato*, M. Furukawa, *Chem. Pharm. Bull.*, 1986, **34**(*12*), 4927-4933



Regioselective reaction of acetoxy allyl phosphonates with nucleophiles catalyzed by palladium(0) complex

J. Zhu, X. Lu*, *Tetrahedron Lett.*, 1987, **28**(*17*), 1897-1900

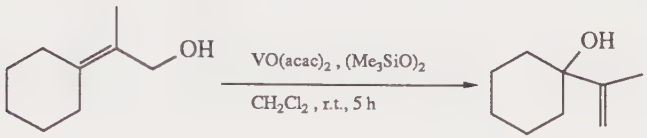


12. Bis(trimethylsilyl) peroxide

CAS Registry Number	5796-98-5
CAS Name	Silane, dioxy bis[trimethyl-
Molecular Formula	$(Me_3SiO)_2$
Molecular Weight	178.38
Boiling Point	42° / 30 mm Hg
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Oxidation. Isomerization. Hydroxylation. A synthon for the hydroxyl cation.
Availability	Not commercially available.
Preparation	*J. Organomet. Chem.*, 1975, **99**(*2*), C31-C32.
Other Preparations	*J. Organomet. Chem.*, 1980, **201**(*1*), 197-211; *Zh. Strukt. Khim.*, 1981, **22**(*4*), 9-15; *Bull. Chem. Soc. Jpn.*, 1985, **58**(*3*), 844-9; *Synthesis*, 1986, (*8*), 633-5.

Isomerization of allylic alcohols

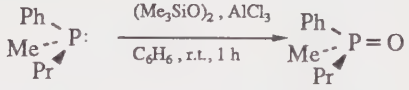
S. Matsubara, T. Okazoe, K. Oshima, K. Takai*, H. Nozaki, *Bull. Chem. Soc. Jpn.*, 1985, **58**(*3*), 844-849



85 %
14 examples

Bis(trimethylsilyl) peroxide as a versatile reagent for stereoselective oxidation of phosphines to phosphine oxides

L. Wozniak, J. Kowalski, J. Chojnowski*, *Tetrahedron Lett.*, 1985, **26**(*40*), 4965-4968



95 % stereospecificity
94 % yield
5 examples

Electrophilic hydroxylation of organolithium compounds with bis(trimethylsilyl) peroxide

P. Molina*, A. Tarraga, M. J. Lidon, *Synthesis*, 1986, (*8*), 633-635

39 - 98 %
12 examples

13. 9-Borabicyclo[3.3.1]nonane (9-BBN)

CAS Registry Number 280-64-8, 21205-91-4 (dimer)

CAS Name 9-Borabicyclo[3.3.1]nonane

Molecular Formula

Molecular Weight 122.02, 244.04 (dimer)

Boiling Point Not available.

Melting Point 150-152°C (dimer)

Density 0.894 kg/m^3 (THF soln)

Refractive Index Not available.

Safety and Handling Flammable liquid. Moisture sensitive. Dimer: Flammable solid.

Fp -22°C (hexanes), -17°C (THF)

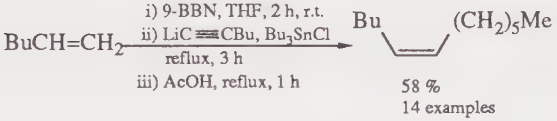
Reactions Hydroborating agent (dimer): *J. Am. Chem. Soc.*, 1974, **96**, 7765.
Reviews: G. W. Kabalka, *J. Organomet. Chem.*, 1987, **318**(1-3), 1-28; **337**(1-3), 169-194.

Availability Aldrich: dimer, crystalline, 98%, £: 0.5M in hexanes, under N_2 in Sure/Seal™ bottles, p; 0.5M in THF under N_2 in Sure/Seal™ bottles and Kilo/Lab™ cylinders, p (cylinders require deposit).

Sigma: dimer, ££.

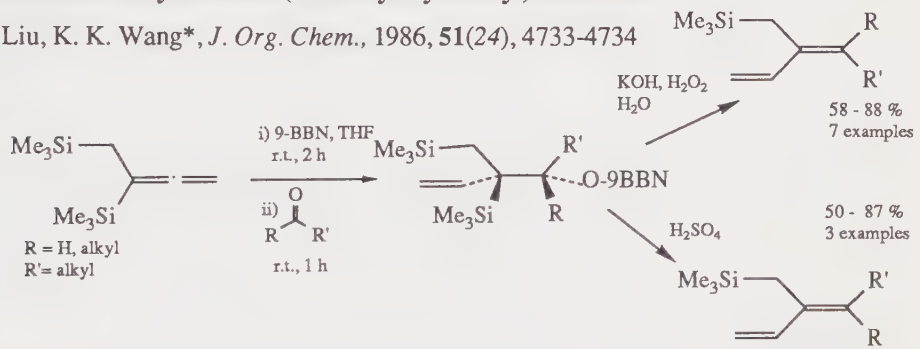
Preparation of (*Z*)-alkenes, ketones and alkynes by trialkyltin chloride induced intramolecular transfer reaction of lithium 1-alkynyltrialkylborates

K. K. Wang*, K.-H. Chu, *J. Org. Chem.*, 1984, **49**(*26*), 5175-5178



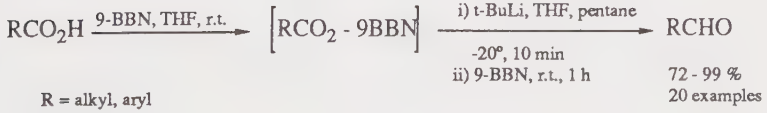
Stereoselective synthesis of (trimethylsilylmethyl)butadienes

C. Liu, K. K. Wang*, *J. Org. Chem.*, 1986, **51**(*24*), 4733-4734



One-pot transformation of carboxylic acids into aldehydes via acyloxyborabicyclononanes

J. S. Cha*, J. E. Kim, M. S. Yook, Y. S. Kim, *Tetrahedron Lett.*, 1987, **28**(*49*), 6231-6234

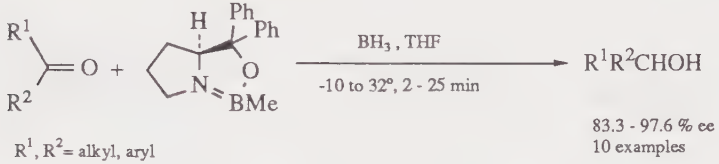


14. Borane

CAS Registry Number	13283-31-3
CAS Name	Borane
Molecular Formula	BH_3
Molecular Weight	13.8
Boiling Point	Not available.
Melting Point	Not available.
Density	0.898 kg/m^3 (THF soln.)
Refractive Index	Not available.
Safety and Handling	Flammable liquid. Moisture sensitive. THF complex may decompose in storage with liberation of hydrogen and bursting of bottle. Fp -17°C
Reactions	Reduction. Hydroboration.
Availability	Aldrich: 1M in THF, under N_2 in Sure/Seal™ bottles and Kilo-Lab™ cylinders, p, (cylinders require deposit), stabilized with <0.005M $NaBH_4$. Also available as complexes of NH_3, Me_2S, phosphines and a wide variety of amines. Lancaster Synthesis: Me_2S complex, 4% excess Me_2S, p, bulk prices available.

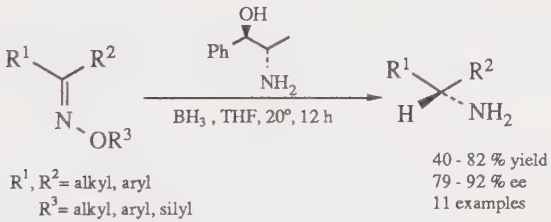
A stable catalyst for the enantioselective reduction of ketones

E. J. Corey, R. R. Bakshi, S. Shibata, C.-P. Chen, V. K. Singh, *J. Am. Chem. Soc.*, 1987, **109**(*25*), 7925-7926



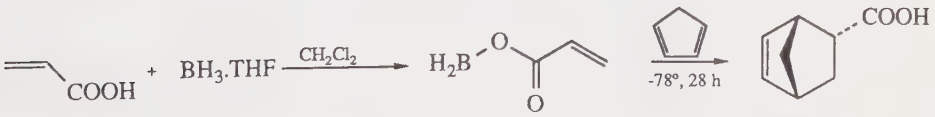
Asymmetric reduction of oxime ethers

Y. Sakito*, Y. Yoneyoshi, G. Suzukamo*, *Tetrahedron Lett.*, 1988, **29**(2), 223-224



Use of acyloxyborane as an activating device for unsaturated carboxylic acids in their reactions with dienes

K. Furuta, Y. Miwa, K. Iwanaga, H. Yamamoto*, *J. Am. Chem. Soc.*, 1988, **110**(*18*), 6254-6255

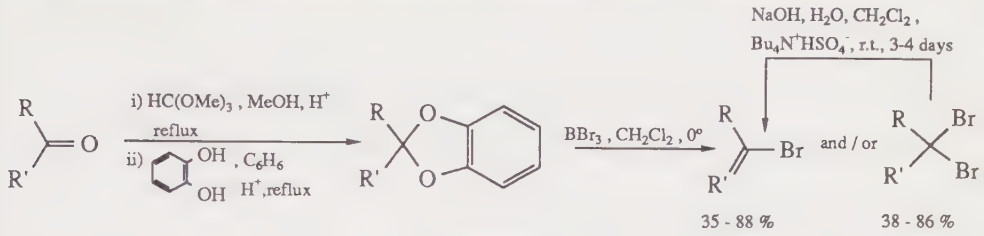


15. Boron tribromide

CAS Registry Number	10294-33-4
CAS Name	Borane, tribromo-
Molecular Formula	BBr_3
Molecular Weight	250.54
Boiling Point	90°C
Melting Point	-46°C
Density	2.560 kg/m^3
Refractive Index	1.5312
Safety and Handling	Corrosive. Moisture sensitive. Reacts violently with water. Very toxic by inhalation and swallowing. Causes severe burns.
Reactions	Mild cleavage and brominating agent.
Availability	Aldrich: 99.999%, £; 99.99%, p; 99+%, p; 1M in CH_2Cl_2, p; 1M in hexanes, p, all under N_2 in ampoules or Sure/Seal™ bottles. Also available as Me_2S complex.

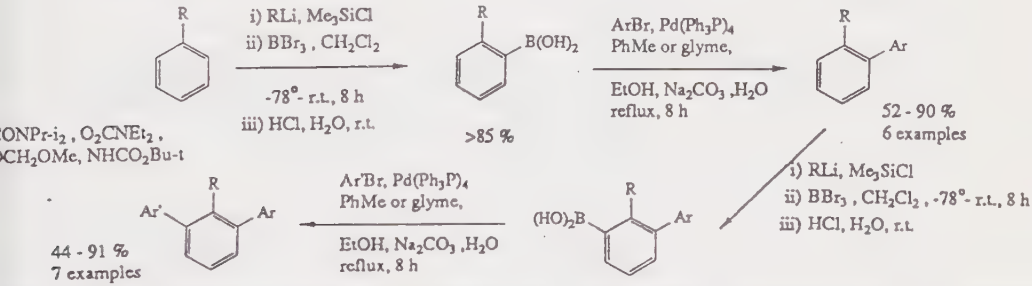
Halogenative deoxygenation of ketones to vinyl bromides and/or *gem*-dibromides

E. Napolitano*, R. Fiaschi, E. Mastrorilli, *Synthesis*, 1986, (*2*), 122-125



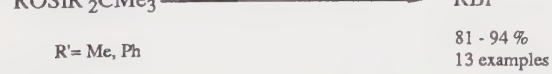
Synthesis of unsymmetrical biphenyls and *m*-terphenyls

M. J. Sharp, W. Cheng, V. Snieckus*, *Tetrahedron Lett.*, 1987, **28**(*43*), 5093-5096, 5097-5098



Direct conversion of silyl ethers into alkyl bromides with boron tribromide

S. Kim*, J. H. Park, *J. Org. Chem.*,1988, **53**(*13*), 3111-3113

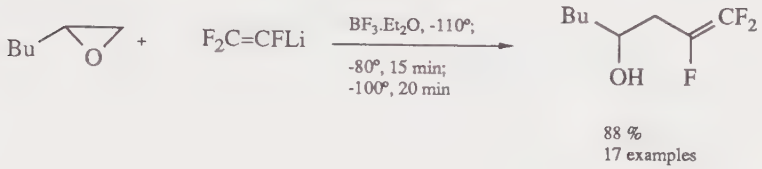


16. Boron trifluoride etherate

CAS Registry Number	109-63-7
CAS Name	Borane, trifluoro[1,1'-oxybis[ethane]]-, (T-4)-
Molecular Formula	$BF_3.OEt_2$
Molecular Weight	141.93, 67.81 (BF_3)
Boiling Point	126°C, -100°C (BF_3)
Melting Point	-58°C, -126.7°C (BF_3)
Density	1.154 kg/m^3, 2.99 kg/m^3 (BF_3)
Refractive Index	1.3480
Safety and Handling	Very toxic by inhalation. Causes severe burns. Reacts violently with water. Reacts with hot alkali or alkaline earth (not Mg) metals with incandescence. Fp 47°C
Reactions	Lewis acid catalyst. Cleavage of various ethers and protecting groups.
Availability	Aldrich: purified, redistilled, under N_2 in Sure/Seal™ bottles, p; in polycoated bottles, p. Also available as dibutyl or dimethyl etherate, $EtNH_2$, MeOH, Me_2S and Pr^nOH complexes. Lancaster Synthesis: p. Sigma: brown liquid, p: redistilled, light yellow liquid, p. Also available as MeOH complex.

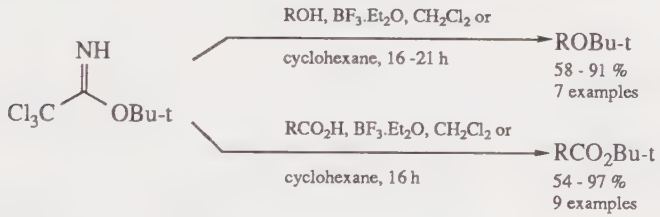
Boron trifluoride promoted ring opening of oxiranes and oxetanes with fluorovinyllithiums. Synthesis of fluoro enols

T. Dubuffet, R. Sauvetre*, J.-F. No, *J. Organomet. Chem.*, 1988, **341**(*1-3*), 11-18



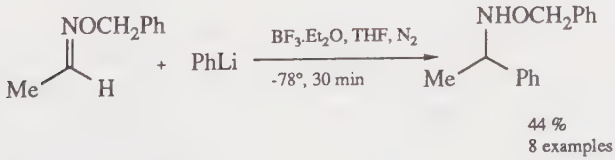
New method for the preparation of tertiary butyl ethers and esters

A. Armstrong, I. Brackenridge, R. F. W. Jackson*, J. M. Kirk, *Tetrahedron Lett.*, 1988, **29**(*20*), 2483-2486



Addition of aryllithium compounds to oxime ethers

K. E. Rodriques*, A. Basha, J. B. Summers, D. W. Brooks, *Tetrahedron Lett.*, 1988, **29**(*28*), 3455-3458

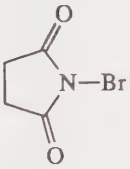


17. *N*-Bromosuccinimide (NBS)

CAS Registry Number 128-08-5

CAS Name 2,5-Pyrrolidinedione, 1-bromo-

Molecular Formula



Molecular Weight 177.99

Boiling Point Not available.

Melting Point 177-181°C (dec.)/180-183°C

Density Not available.

Refractive Index Not available.

Safety and Handling Moisture sensitive. Irritant. Causes burns.

Reactions Selective brominating agent.
Reviews: *Chem. Rev.*, 1948, **43**, 271; 1970, **70**, 639; *Org. React.*, 1983, **29**, 1.

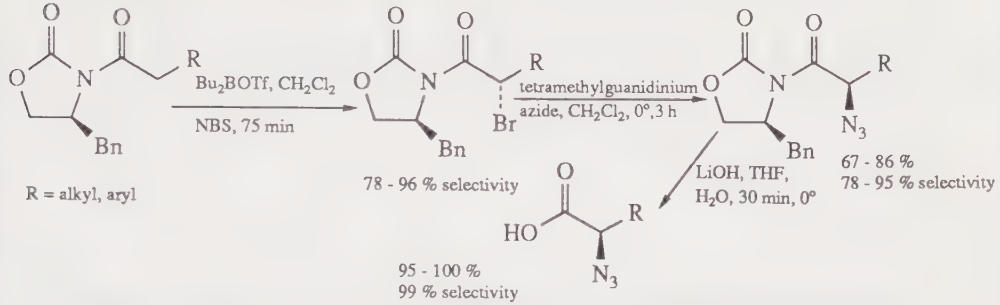
Availability Aldrich: 99%, p.

Lancaster Synthesis: 99%, p, bulk prices available.

Sigma: crystalline, p.

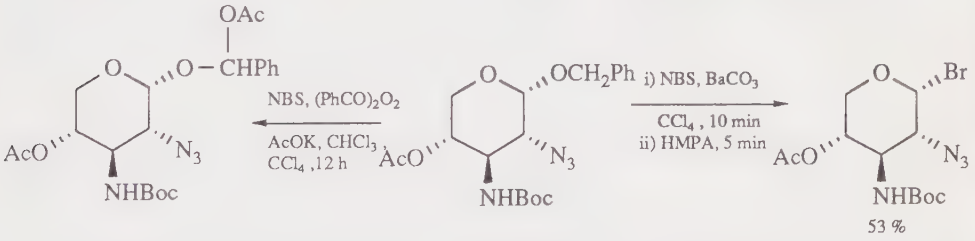
Asymmetric halogenation of chiral imide enolates. Synthesis of enantiomerically pure α-amino acids

D. A. Evans*, J. A. Ellman, R. L. Dorow, *Tetrahedron Lett.*, 1987, **28**(*11*), 1123-1126



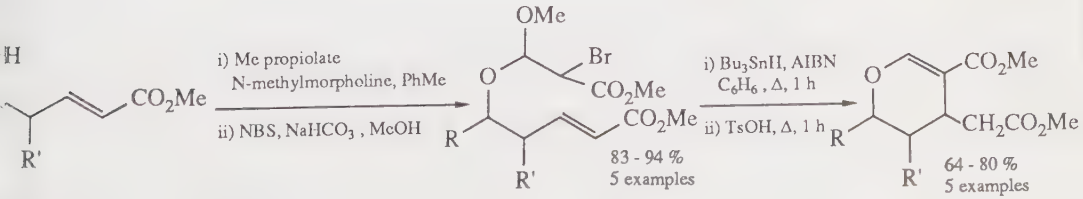
One-pot synthesis of glycosyl bromides and acetates from benzyl glycosides with NBS

H. Hashimoto*, M. Kawa, Y. Saito, T. Date, S. Horito, J. Yoshimura, *Tetrahedron Lett.*, 1987, **28**(*30*), 3505-3508



A new route to substituted 3-methoxycarbonyldihydropyrans

S. Hatakeyama, N. Ochi, H. Numata, S. Takano*, *J. Chem. Soc., Chem. Commun.*, 1988, (*17*), 1202-1204

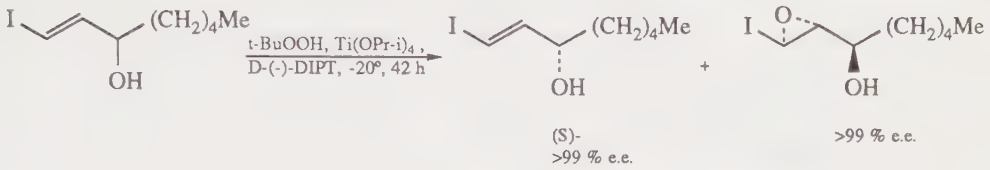


18. *tert*-Butyl hydroperoxide (TBHP)

CAS Registry Number	75-91-2
CAS Name	Hydroperoxide, 1,1-dimethylethyl
Molecular Formula	Me_3COOH
Molecular Weight	90.12
Boiling Point	89°C (dec.)
Melting Point	6°C
Density	0.901 kg/m^3
Refractive Index	1.3980
Safety and Handling	Flammable. Oxidizer. Harmful. Irritating to eyes and skin. Stable below 75°C. Liable to explode when distilled. Fp 27°C (36°C)
Reactions	Selective oxygenation reagent. Epoxidizer in anhydrous form. Review: *Aldrichim. Acta*, 1979, **12**(*4*), 63.
Availability	Aldrich: 90% (5% H_2O, 5% Bu^tOH), 70% (remainder H_2O), p; anhydrous, 3M in 2,2,4-trimethylpentane, p. Lancaster Synthesis: 70% aq. soln, p. For azeotropic drying, see Lancaster Synthesis catalogue and *J. Org. Chem.*, 1983, **48**, 3607. Sigma: 70% aq. soln, p.

Synthesis of optically pure γ-iodo allyl alcohols

Y. Kitano*, T. Matsumoto, T. Wakasa, S. Okamoto, T. Shimazaki, Y. Kobayashi, F. Sato*, K. Miyaji, K. Arai, *Tetrahedron Lett.*, 1987, **28**(*50*), 6351-6354

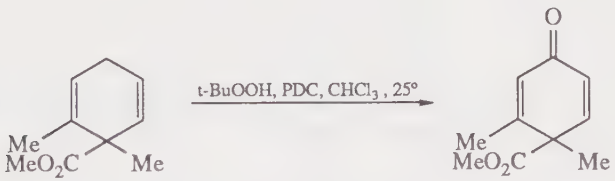


(S)-
>99 % e.e.

>99 % e.e.

Improved synthesis of 2,5-cyclohexadien-1-ones via bis-allylic oxidation of 1,4-cyclohexadienes

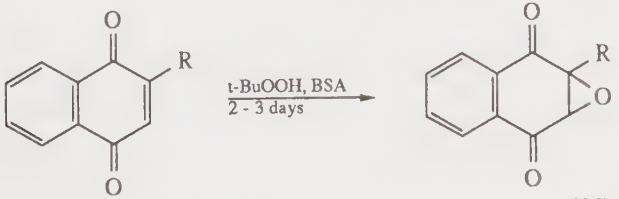
A. G. Schultz*, A. G. Taveras, R. E. Harrington, *Tetrahedron Lett.*, 1988, **29**(*32*), 3907-3910



74 %
18 examples

Enantioselective synthesis of epoxynaphthoquinones via asymmetric Weitz-Scheffer epoxidation promoted by bovine serum albumin

S. Colonna, N. Gaggero, A. Manfredi, M. Spadoni, L. Casella, G. Carrea, P. Pasta, *Tetrahedron*, 1988, **44**(*16*), 5169-5178



29 - 66 % yield
5 - 100 % ee
8 examples

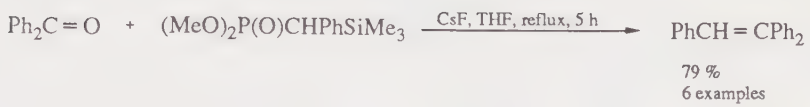
BSA = bovine serum albumin
R = alkyl, Ph

19. Caesium fluoride

CAS Registry Number	13400-13-0
CAS Name	Cesium fluoride (CsF)
Molecular Formula	CsF
Molecular Weight	151.90
Boiling Point	1251°C
Melting Point	682°C
Density	4.115 kg/m^3
Refractive Index	1.478
Safety and Handling	Irritant. Hygroscopic.
Reactions	Horner-Emmons reaction. Fluoride ion-activated alkylation. Fluorination.
Availability	Aldrich: 99.99%, ££; 99.9%, £; 99%, p. Johnson Matthey: crystalline powder, Puratronic®, £; pieces, 99.99%, £; 99%, p. Sigma: crystalline, £.

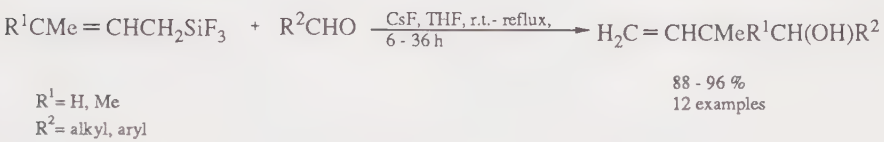
Fluoride ion induced Horner-Emmons reaction of α-silylalkylphosphonic derivatives with carbonyl compounds

T. Kawashima*, T. Ishii, N. Inamoto*, *Bull. Chem. Soc. Jpn.*, 1987, **60**(*5*), 1831-1837



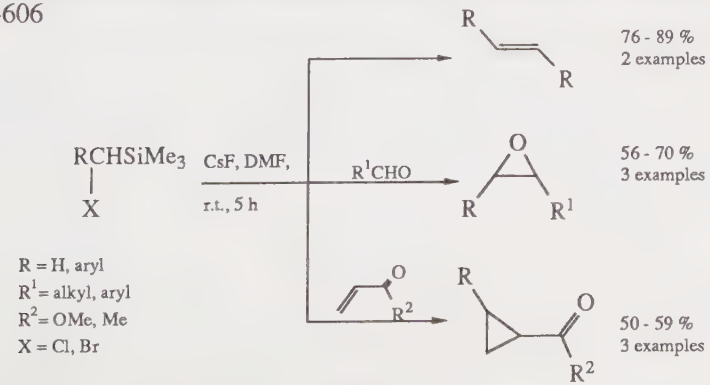
Regiospecific and stereoselective alkylation of aldehydes with allyltrifluorosilane activated by fluoride ions

M. Kira*, M. Kobayashi, H. Sakurai*, *Tetrahedron Lett.*, 1987, **28**(*35*), 4081-4084



Fluoride-initiated reactions of α-halosilanes. Synthesis of stilbenes, epoxides and cyclopropanes

S. V. Kessar*, P. Singh, D. Venugopal, *Indian J. Chem., Sect. B*, 1987, **26**(*7*), 605-606

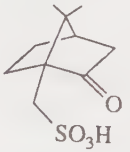


20. Camphorsulphonic acid (CSA)

CAS Registry Number 3144-16-9, 35963-20-3, 5872-08-2

CAS Name Bicyclo[2.2.1]heptane-1-methanesulfonic acid, 7,7-dimethyl-2-oxo-

Molecular Formula



Molecular Weight 232.30

Boiling Point Not available.

Melting Point 198°C (dec.) (1*R*)-(-), 206°C (dec.) (±)-, 194°C (dec.) (1*S*)-(+)

Density Not available.

Specific Rotation $[\alpha]_D^{20}$ -21° (c=2, H_2O) (1*R*)-(-), $[\alpha]_D^{20}$ +19.9° (c=2, H_2O) (1*S*)-(+)

Safety and Handling Corrosive. Hygroscopic. Irritant.

Reactions Resolving agent: (1*S*)-(+).

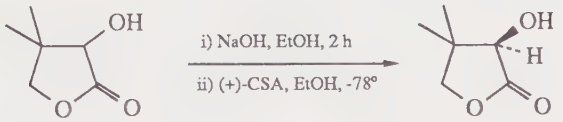
Availability Aldrich: (1*R*)-(-), 98%, p; monohydrate, 98%, p; (±), anhydrous, 98%, p; (1*S*)-(+), 99%, p.

Lancaster Synthesis: (±), 98%, p; (1*S*)-(+), monohydrate, 99%, p, bulk prices available.

Sigma: (1*R*)-(-), p; (1*S*)-(+), p.

Kinetic resolution of lactones with camphorsulphonic acid

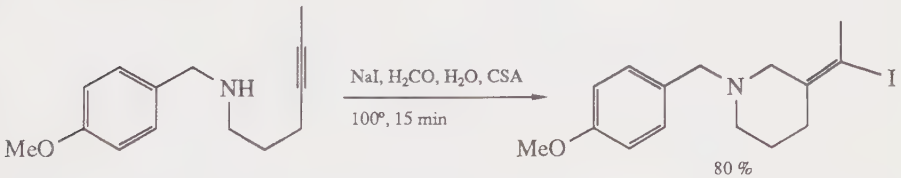
K. Fuji*, M. Node, M. Murata, S. Terada, K. Hashimoto, *Tetrahedron Lett.*, 1986, **27**(*44*), 5381-5382



(R)-(-)-
61.5 %
88.4 % ee

Nucleophile-promoted electrophilic cyclization of amino alkynes

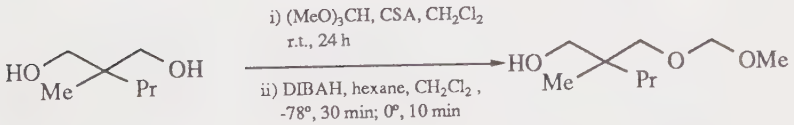
L. E. Overman*, M. J. Sharp, *J. Am. Chem. Soc.*, 1988, **110**(2), 612-614



80 %
11 examples

A convenient, regioselective monoprotection of diols

M. Takasu, Y. Naruse, H. Yamamoto*, *Tetrahedron Lett.*, 1988, **29**(*16*), 1947-1950



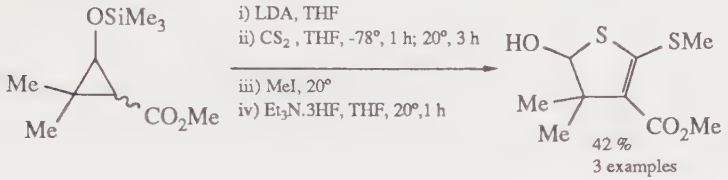
92 %
14 examples

21. Carbon disulphide

CAS Registry Number	75-15-0
CAS Name	Carbon disulphide
Molecular Formula	CS_2
Molecular Weight	76.14
Boiling Point	46°C
Melting Point	-112°C
Density	1.266 kg/m^3
Refractive Index	1.6270
Safety and Handling	Extremely flammable. Very toxic by inhalation. Fp -33°C
Reactions	Addition. Condensation. Insertion. Review: M. Yokoyama, T. Imamoto, *Synthesis*, 1984, (*10*), 797-824.
Availability	Aldrich, 99.9+%, HPLC grade (800 ml unit in Sure/Seal™ bottle), p; 99+%, spectrophotometric grade, p; ACS reagent, p.

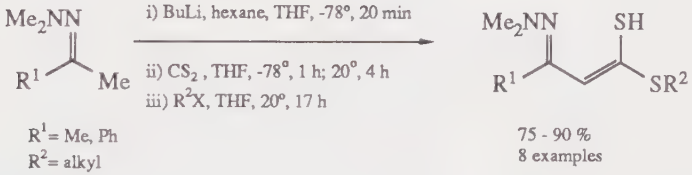
Thiophenes by rearrangement of silyloxycyclopropane carboxylates

C. Bruckner, H.-U. Reissig*, *Angew. Chem., Int. Ed. Engl.*, 1985, **24**(*7*), 588-589



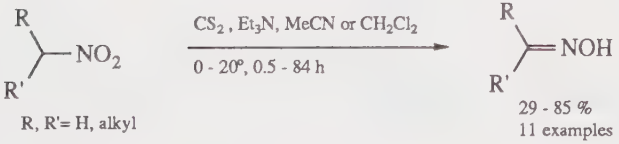
Synthesis of alkyl dimethylhydrazono alkanedithioates

A. Oliva*, P. Delgado, *Synthesis*, 1986, (*10*), 865-866



Reduction of nitro compounds to oximes

D. H. R. Barton*, I. Fernandez, C. S. Richard, S. Z. Zard, *Tetrahedron*, 1987, **43**(*3*), 551-558

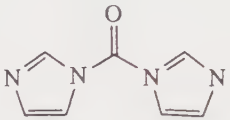


22. 1,1'-Carbonyldiimidazole (Carbodiimidazole)

CAS Registry Number 530-62-1

CAS Name 1*H*-Imidazole, 1,1-carbonylbis-

Molecular Formula



Molecular Weight 162.15

Boiling Point Not available.

Melting Point 118-120°C

Density Not available.

Refractive Index Not available.

Safety and Handling Harmful. Irritant. Moisture sensitive. Handle with exclusion of atmospheric moisture - hydrolyzed by water in a few seconds with evolution of CO_2.

Reactions Prepared by reaction of imidazole in dry THF with phosgene in dry benzene: H. A. Staab, K. Wendel, *Ber.*, 1963, 96(*12*), 3374. Peptide-coupling reagent. Reagent for carbonate and ester formation. Oxidizing agent. Dehydrating agent.

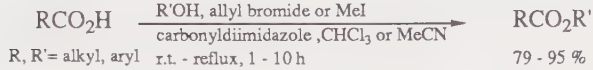
Availability Aldrich: £.

Lancaster Synthesis: £, bulk prices available.

Sigma: £.

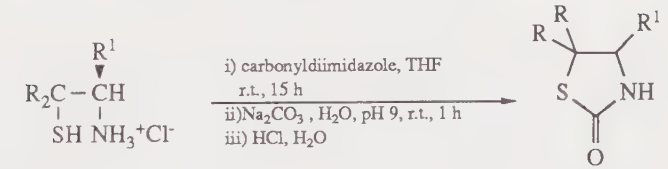
Esterification of carboxylic acids using carbonyldiimidazole and reactive halides

T. Kamijo*, H. Harada, K. Iizuka*, *Chem. Pharm. Bull.*, 1984, **32**(*12*), 5044-5047



A facile synthesis of thiazolidinones

M. d'Ischia, G. Prota*, R. C. Rotteveel, W. Westerhof, *Synth. Commun.*, 1987, **17**(*13*), 1577-1585

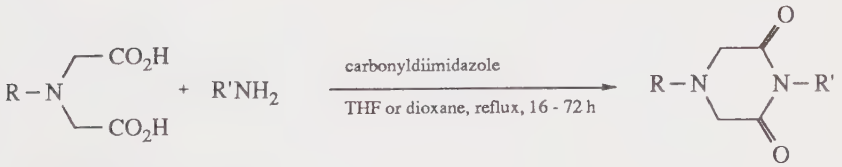


R = H, Me
R^1 = H, CO_2Et, CO_2Me

63 - 86 %
3 examples

Single-step conversion of primary amines to piperazinediones

C. G. Kruse*, J. J. Troost, P. Cohen-Fernandes, H. van der Linden, J. D. Van Loon, *Recl. Trav. Chim. Pays-Bas*, 1988, **107**(*4*), 303-309



R = $PhCH_2$, Ph
R'= alkyl, aryl

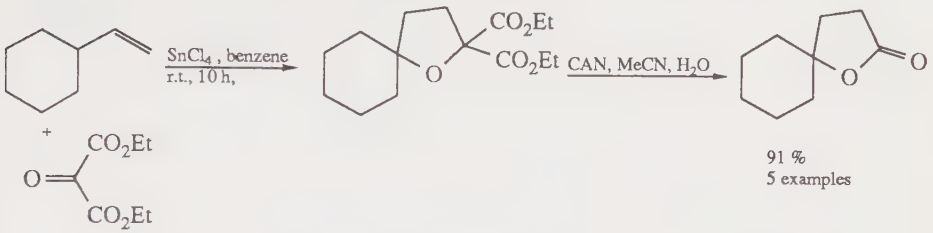
63 - 98 %
25 examples

23. Cerium(IV) ammonium nitrate (CAN, Ceric ammonium nitrate)

CAS Registry Number	16774-21-3
CAS Name	Cerate(2-), hexakis(nitrato-*O*)-, diammonium, (*OC*-6-11)-
Molecular Formula	$(NH_4)_2Ce(NO_3)_6$
Molecular Weight	548.23
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Oxidizer. Irritant.
Reactions	On silica gel, mild oxidizing agent of hydroquinones, catechols, phenols to quinones: *Synthesis*, 1985, 641. Review: *Synthesis*, 1973, 347-354.
Availability	Aldrich: 99.99%, p; ACS Reagent, 99+%, p; volumetric standard, 0.05N in 4 wt % nitric acid, p. Also available on alumina and silica gel. Johnson Matthey: Crystalline powder, 99.5%, p. Sigma: p.

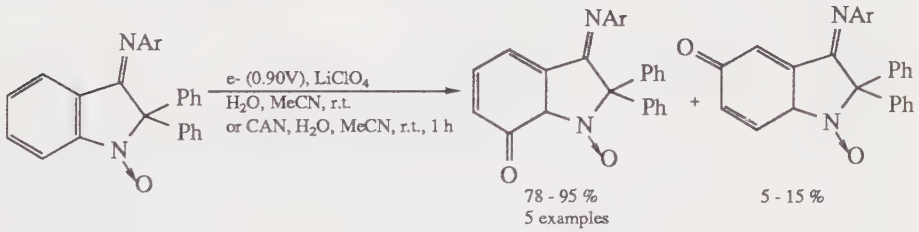
Oxidative bisdecarboxylation of α-alkoxymalonic acids with cerium(IV)

R. G. Salomon*, S. Roy, M. F. Salomon, *Tetrahedron Lett.*, 1988, **29**(*7*), 769-772



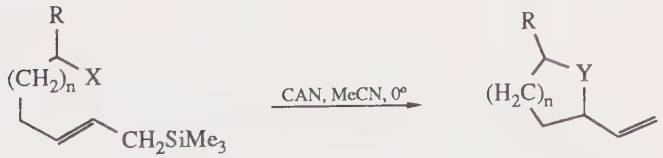
Chemical and electrochemical synthesis of quinone imine *N*-oxides from indolinone arylimino nitroxides

A. Alberti, R. Andruzzi, L. Greci*, P. Stipa, G. Marrosu, A. Trazza, M. Poloni, *Tetrahedron*, 1988, **44**(*5*), 1503-1510



Oxidative ring closure of allylsilanes with cerium(IV) ammonium nitrate

S. R. Wilson*, C. E. Augelli-Szafran, *Tetrahedron*, 1988, **44**(*13*), 3983-3995



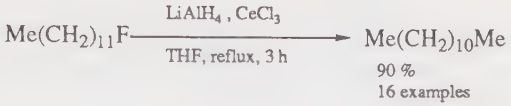
X = OH, NR'2
Y = O, NR'
R, R'= H, alkyl

24. Cerium(III) chloride (Cerous chloride)

CAS Registry Number	7790-86-5 (anhydrous), 18618-55-8 (heptahydrate)
CAS Name	Cerium chloride ($CeCl_3$)
Molecular Formula	$CeCl_3$
Molecular Weight	246.48, 372.59 (heptahydrate)
Boiling Point	1727°C
Melting Point	848°C (heptahydrate)
Density	3.970, 3.920 kg/m^3 (heptahydrate)
Refractive Index	Not available.
Safety and Handling	Hygroscopic.
Reactions	Mild selective reducing agent.
Availability	Aldrich: anhydrous, 99.9%, £; heptahydrate, 99.999%, ££; 99%, p. Johnson Matthey: hydrate, crystalline, 99.9%, p; hydrate, crystalline, 99.99%, p. Sigma: heptahydrate, crystalline, p.

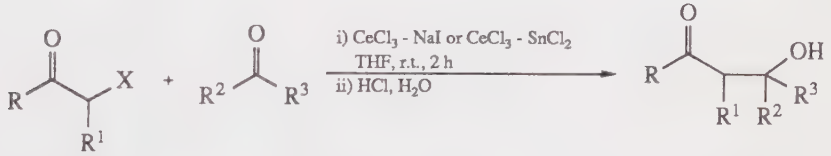
Facile reduction of organic halides and phosphine oxides with lithium aluminium hydride and cerium trichloride

T. Imamoto*, T. Takeyama, T. Kusumoto, *Chem. Lett.*, 1985, (*10*), 1491



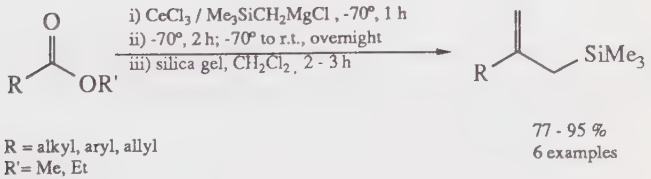
Reaction of α-halo ketones with carbonyl compounds promoted by cerium halides

S. Fukuzawa*, T. Tsuruta, T. Fujinami, S. Sakai, *J. Chem. Soc., Perkin Trans. 1*, 1987, (*7*), 1473-1477



Cerium-mediated conversion of esters to allylsilanes

B. A. Narayanan, W. H. Bunnelle*, *Tetrahedron Lett.*, 1987, **28**(*50*), 6261-6264

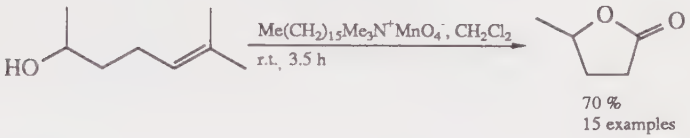


25. Cetyltrimethylammonium permanganate

CAS Registry Number	73257-07-5
CAS Name	1-Hexadecanaminium, *N,N,N*-trimethyl-, salt with permanganic acid ($HMnO_4$)(1:1)
Molecular Formula	$C_{16}H_{33}Me_3N.MnO_4$
Molecular Weight	Not available.
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Oxidation. Hydroxylation. Oxidative cleavage.
Availability	Not commercially available.
Preparation	*Synthesis*, 1984, (*5*), 431-433.
Other Preparations	*Mikrochim. Acta*, 1979, **2**(*5-6*), 373-381; *J. Org. Chem.*, 1984, **49**(*23*), 4509-4516.

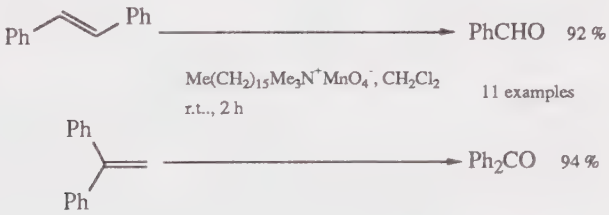
Oxidative cyclization of hydroxy alkenes with cetyltrimethylammonium permanganate. Synthesis of γ- and δ-lactones

R. Rathore, P. S. Vankar, S. Chandrasekaran*, *Tetrahedron Lett.*, 1986, **27**(*34*), 4079-4082



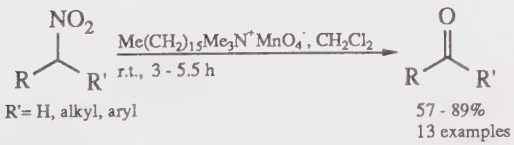
Cetyltrimethylammonium permanganate: a useful reagent for selective oxidative cleavage of aryl alkenes

R. Rathore, S. Chandrasekaran*, *J. Chem. Res.*, 1986, (*12*), 458-459



A mild and selective method for the conversion of nitroalkanes to carbonyl compounds

P.S. Vankar, R. Rathore, S. Chandrasekaran*, *Synth. Commun.*, 1987, **17**(*2*), 195-201

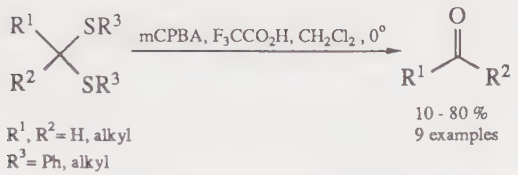


26. 3-Chloroperoxybenzoic acid (mCPBA)

CAS Registry Number	937-14-4
CAS Name	Benzenecarboperoxoic acid, 3-chloro-
Molecular Formula	$ClC_6H_4CO_3H$
Molecular Weight	172.57
Boiling Point	Not available.
Melting Point	92-94°C (dec.)
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Irritant. Oxidizer.
Reactions	Versatile stable oxidizing agent.
Availability	Aldrich: tech. grade, 50-55%, p. Contains 7-10% mCPBA, remainder H_2O. Lancaster Synthesis: 50-55%; p. Contains 10% mCPBA, remainder H_2O. Sigma: practical grade approx. 85%, crystalline, p.

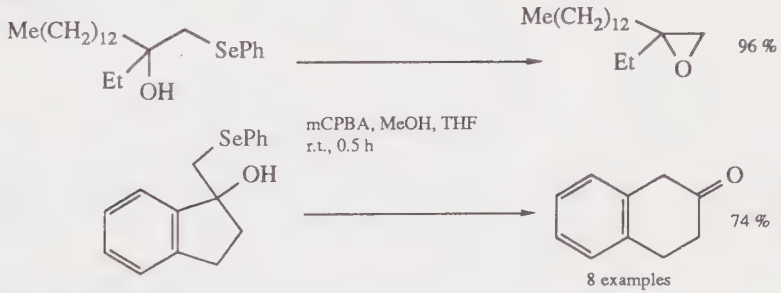
Cleavage of dithioacetals to the corresponding carbonyl compounds

J. Cossy, *Synthesis*, 1987, (*12*), 1113-1115



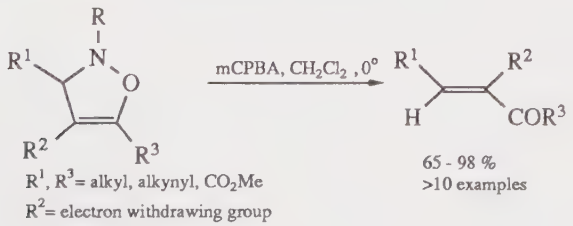
Oxidative conversion of β-hydroxy selenides to epoxides and ketones with mCPBA

S. Uemura*, K. Ohe, N. Sugita, *J. Chem. Soc., Chem. Commun.*, 1988, (*2*), 111-112



Preparation of α,β-unsaturated carbonyl compounds by peracid oxidation of isoxazolines

A. Padwa*, U. Chiacchio, D. N. Kline, J. Perumattan, *J. Org. Chem.*, 1988, **53**(*10*), 2238-2245

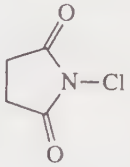


27. *N*-Chlorosuccinimide (NCS)

CAS Registry Number 128-09-6

CAS Name 2,5-Pyrrolinedione, 1-chloro-

Molecular Formula



Molecular Weight 133.53

Boiling Point Not available.

Melting Point 150-152°C

Density 1.65 kg/m^3

Refractive Index Not available.

Safety and Handling Corrosive. Moisture sensitive. Violent or explosive reaction with aliphatic alcohols.

Reactions Source of positive chlorine for oxidation and chlorination. Conversion of 1° and 2° alcohols to carbonyls, allylic and benzylic alcohols to halides.

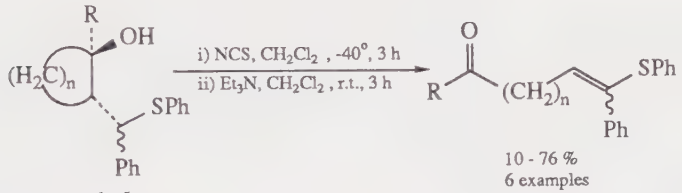
Availability Aldrich: 98+%, p.

Lancaster Synthesis: 98+%, p, bulk prices available.

Sigma: 95-98%, crystalline, p.

Ring cleavage of (α-phenylthiobenzyl)cycloalkanols

M. Yasumura*, K. Takaki, T. Tamura, K. Negoro, *Bull. Chem. Soc. Jpn.*, 1986, **59**(*1*), 317-318

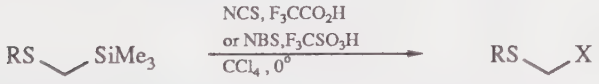


n = 3 - 5
R = H, Me

10 - 76 %
6 examples

Preparation of α-acyloxy and α-halo sulphides via desilylative rearrangement of sulphides and sulphoxides

H. Ishibashi*, H. Nakatani, K. Maruyama, K. Minami, M. Ikeda, *J. Chem. Soc., Chem. Commun.*, 1987, (*19*), 1443-1445

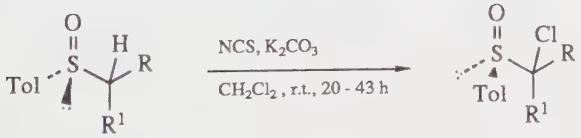


R = alkyl, aryl

X = Cl, Br
43 - 98 %
10 examples

Preparation of 1-chloroalkyl *p*-tolyl sulphoxides in high optical yields

T. Satoh, T. Oohara, Y. Ueda, K. Yamakawa*, *Tetrahedron Lett.*, 1988, **29**(*3*), 313-316



R = H, Me
R^1 = H, Me, CH_2Ph

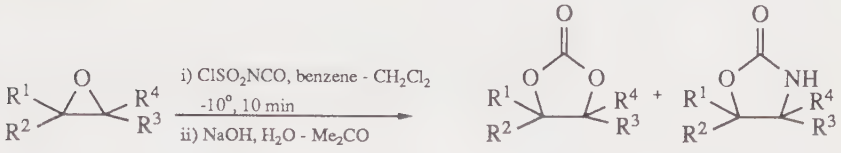
88 - 94 %
87 - 94 % ee
4 examples

28. Chlorosulphonyl isocyanate (*N*-Carbonylsulphamyl chloride)

CAS Registry Number	1189-71-5
CAS Name	Sulfuryl chloride isocyanate
Molecular Formula	$ClSO_2NCO$
Molecular Weight	141.53
Boiling Point	107°C
Melting Point	-44°C
Density	1.626 kg/m^3
Refractive Index	1.4467
Safety and Handling	Corrosive. Lachrymatory.
Reactions	Most chemically reactive isocyanate known. Forms β-lactams by cycloaddition to unactivated unsaturated hydrocarbons. Reviews: D. N. Dhar, K. S. K. Murthy, *Synthesis*, 1986, (*6*), 437-449; A. Kamal, P. B. Sattur, *Heterocycles*, 1987, **26**(*4*), 1051-1076.
Availability	Aldrich: 98%, p. Sigma: p.

Synthesis of 1,3-dioxolan-2-ones from epoxides using chlorosulphonyl isocyanate

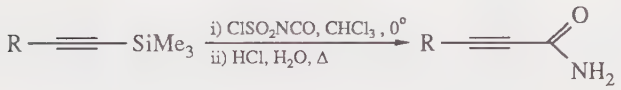
K. S. K. Murthy, D. N. Dhar*, *Synth. Commun.*, 1984, **14**(*7*), 687-695



R^1- R^4= H, aryl, alkyl

Synthesis of primary 2-alkynamides

P. C. B. Page*, S. Rosenthal, R. V. Williams, *Synthesis*, 1988, (*8*), 621-623



R = alkyl, Ph

54 - 71 %
4 examples

Efficient synthesis of cyclic enamides and 2*H*-pyrroles

S. P. Joseph, D. N. Dhar*, *Tetrahedron*, 1988, **44**(*16*), 5209-5214

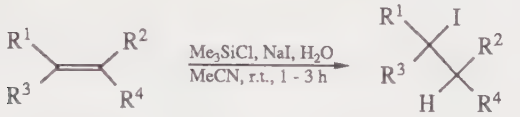
42 %
13 examples

29. Chlorotrimethylsilane

CAS Registry Number	75-77-4
CAS Name	Silane, chlorotrimethyl-
Molecular Formula	Me_3SiCl
Molecular Weight	108.64
Boiling Point	57°C
Melting Point	-40°C
Density	0.856 kg/m^3
Refractive Index	1.3870
Safety and Handling	Flammable liquid. Corrosive. Reacts violently with water. Irritating to eyes and respiratory system. Fp -18°C
Reactions	Reagent for preparation of volatile TMS ethers for GC analysis. Silylating agent. Reviews: R. Muller, *Z. Chem.*, 1985, **25**(*9*), 309-318; *Angew. Chem.*, 1965, **77**, 417; *Synthesis*, 1985, 817.
Availability	Aldrich: 98%, p. Lancaster Synthesis: 98+%, p, bulk prices available. Sigma: p.

Synthesis of alkyl iodides by hydroiodination of alkenes

S. Irifune, T. Kibayashi, Y. Ishii*, M. Ogawa, *Synthesis*, 1988, (*5*), 366-369



R^1 - R^3 = H, alkyl
R^4 = H, CN, COMe

65 - 69 %
10 examples

Chlorination of ketones by trimethylchlorosilane and dimethyl sulphoxide with bromide ion catalysis

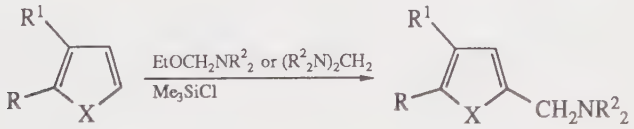
R. B. Fraser*, F. Kong, *Synth. Commun.*, 1988, **18**(*10*), 1071-1077

R, R' = alkyl, aryl
R^2 = alkyl

29 - 98 %
8 examples

Mannich reactions of nucleophilic aromatic compounds involving aminals and α-amino ethers activated by chlorosilane derivatives

H. Heaney*, G. Papageorgiou, R. F. Wilkins, *J. Chem. Soc., Chem. Commun.*, 1988, (*17*), 1161-1163



X = N, O
R, R^1 = Me, H, C_4H_4
R^2 = allyl, cycloalkyl

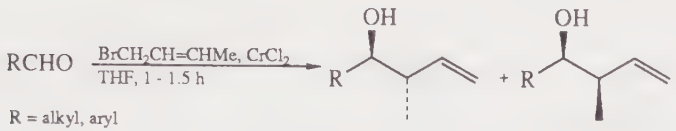
15 - 86 %
21 examples

30. Chromium(II) chloride

CAS Registry Number	10049-05-5
CAS Name	Chromium chloride ($CrCl_2$)
Molecular Formula	$CrCl_2$
Molecular Weight	122.90
Boiling Point	Not available.
Melting Point	824°C
Density	2.900 kg/m^3
Refractive Index	Not available.
Safety and Handling	Moisture sensitive. Irritant.
Reactions	Reduction.
Availability	Aldrich: anhydrous, tech. grade, ff. May contain 1-2% insoluble matter. Johnson Matthey: powder, 98%, ff.

Chromium(II) mediated synthesis of homoallylic alcohols

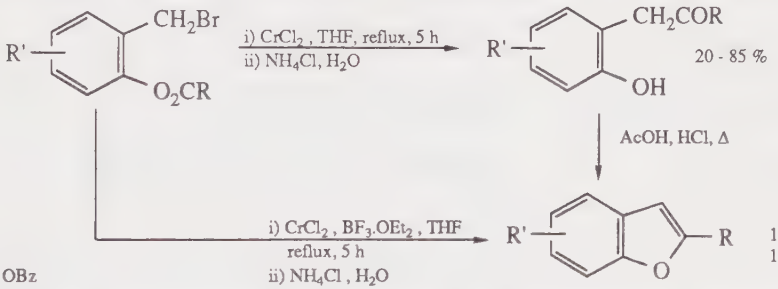
P. G. M. Wutts*, G. R. Callen, *Synth. Commun.*, 1986, **16**(*14*), 1833-1837



59 - 99 %
threo: erythro 1.4 - 15.9:1
11 examples

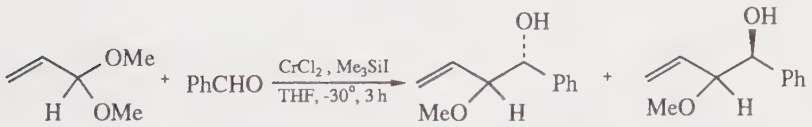
Preparation of *ortho*-hydroxybenzyl ketones and benzofurans from acyloxybenzyl bromides via their chromium complexes

B. Ledoussal, A. Gorgues*, A. Le Coq, *Tetrahedron*, 1987, **43**(*24*), 5841-5852



Reduction of acrolein dialkyl acetals with chromium(II) chloride

K. Takai*, K. Nitta, K. Utimoto, *Tetrahedron Lett.*, 1988, **29**(*41*), 5263-5266



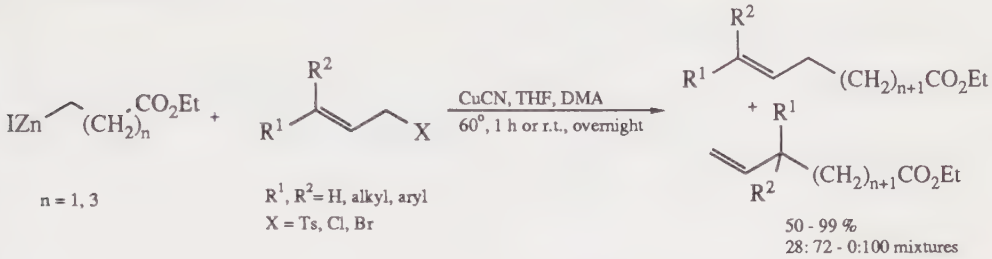
99 %, 88:12
13 examples

31. Copper(I) cyanide

CAS Registry Number	544-92-3
CAS Name	Copper cyanide (CuCN)
Molecular Formula	CuCN
Molecular Weight	89.56
Boiling Point	Not available.
Melting Point	473°C (in N_2)
Density	2.920 kg/m^3
Refractive Index	Not available.
Safety and Handling	Highly toxic. Irritant.
Reactions	Reagents for synthesis of organocuprates.
Availability	Aldrich: 99%, p. Johnson Matthey: crystalline, p.

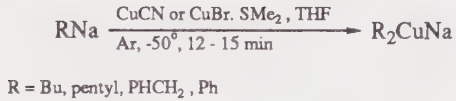
Synthesis of enoates by copper(I)-catalyzed allylation of zinc esters

H. Ochiai, Y. Tamaru, K. Tsukaki, Z. Yoshida*, *J. Org. Chem.*, 1987, **52**(*19*), 4418-4420



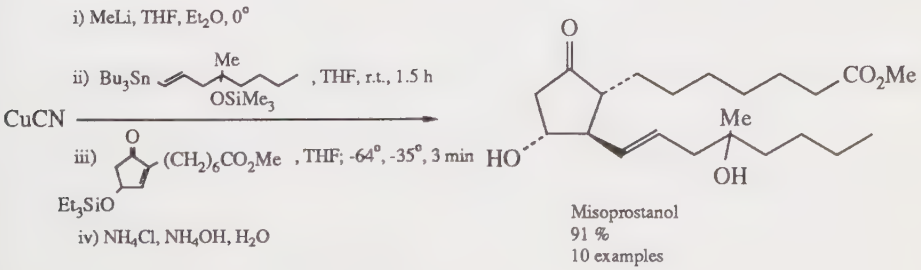
Synthesis of sodium organocuprates

S. H. Bertz*, C. P. Gibson, G. Dabbagh, *Organometallics*, 1988, **7**(*1*), 227-232

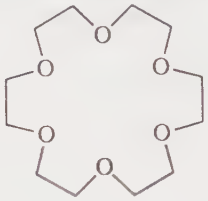


In-situ cuprate formation via transmetallation between vinylstannanes and higher order cyanocuprates. Application to prostaglandin synthesis

J. R. Behling, K. A. Babiak, J. S. Ng, A. L. Campbell*, R. Moretti, M. Koerner, B. H. Lipshutz*, *J. Am. Chem. Soc.*, 1988, **110**(*8*), 2641-2643

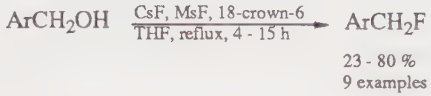


32. 18-Crown-6

CAS Registry Number	17455-13-9
CAS Name	1,4,7,10,13,16-Hexaoxacyclooctadecane
Molecular Formula	
Molecular Weight	264.32
Boiling Point	Not available.
Melting Point	37-39°C (from MeCN)
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Irritant. Moisture sensitive.
Reactions	Complexing agent to solubilize alkali metal ions in non-polar solvents. Reviews: *Synthesis*, 1976, 168; *J. Heterocycl. Chem.*, 1982, **19**, 3.
Availability	Aldrich: 99.5+%, Gold Label, £££; 99%, £. Lancaster Synthesis: 98+%, £, bulk prices available. Sigma: £.

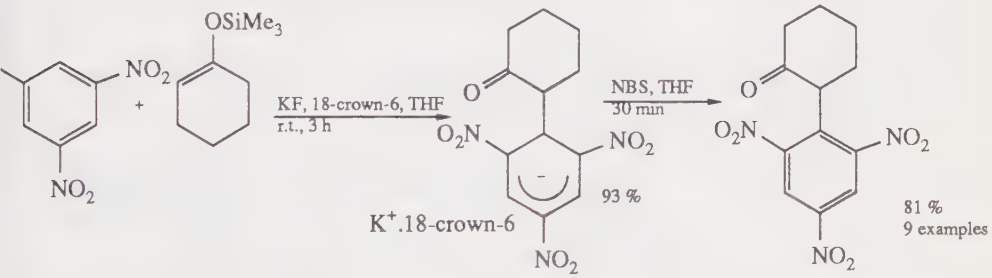
Selective fluorination of methanols with methanesulphonyl fluoride, caesium fluoride and 18-crown-6

K. Makino, H. Yoshioka*, *J. Fluorine Chem.*, 1987, **35**(*4*), 677-683



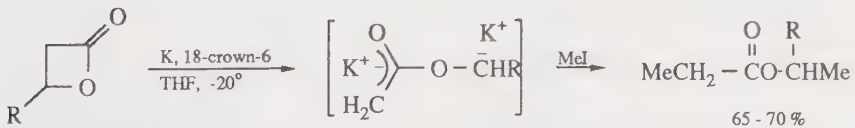
Alkylation and acylation of trinitrobenzene with silyl enol ethers

G. A. Artamkina*, S. V. Kovalenko, I. P. Beletskaya, O. A. Reutov, *J. Organomet. Chem.*, 1987, **329**(*2*), 139-150



Convenient route to enolate anions via a novel reaction between β-propiolactones and a solution of potassium containing 18-crown-6

Z. Jedlinski*, M. Kowalczuk, A. Misiolek, *J. Chem. Soc., Chem. Commun.*, 1988, (*18*), 1261-1262



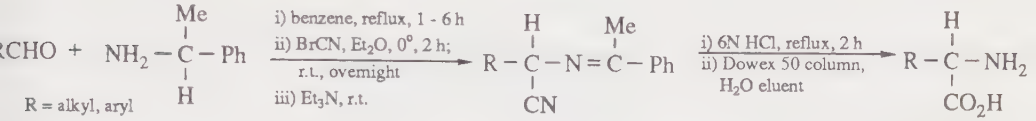
R = H, Me

33. Cyanogen bromide (Bromine cyanide)

CAS Registry Number	506-68-3
CAS Name	Cyanogen bromide
Molecular Formula	BrCN
Molecular Weight	105.93
Boiling Point	61-62°C
Melting Point	49-51°C
Density	1.039 (MeCN soln)
Refractive Index	Not available.
Safety and Handling	Highly toxic. Irritant. Fp 5°C
Reactions	Cyanation. Bromination. Activating agent for insoluble supports for affinity absorption. *Anal. Biochem.*, 1974, **60**, 149.
Availability	Aldrich: 97%, p; 5M in MeCN, under N_2 in Sure/Seal™ bottles, p. Sigma: p. Also available on Sepharose support as affinity chromatography media.

Asymmetric synthesis of α-amino acids

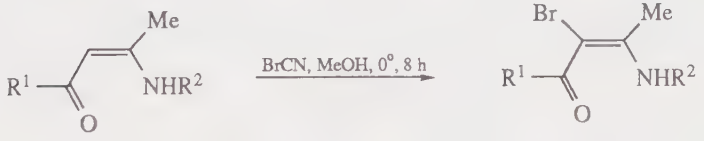
S. K. Phadtare, S. K. Kamat, G. T. Panse*, *Indian J. Chem., Sect. B*, 1985, **24**(*8*), 811-814



20 - 65 % from Schiff's base
< 52 % optical purity
8 examples

Bromination of β-amino enones with cyanogen bromide

A. Alberola*, C. Andres, A. Gonzalez Ortega, R. Pedrosa, M. Vicente, *Synth. Commun.*, 1986, **16**(*10*), 1161-1165

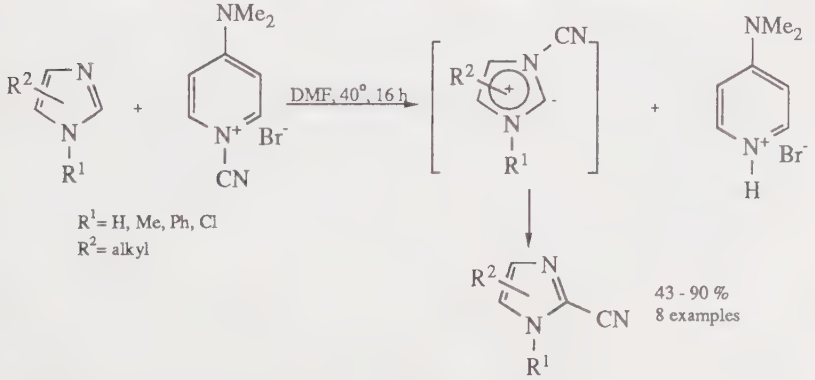


R^1 = alkyl
R^2 = H, Ph

50 - 96 %
6 examples

Cyanogen bromide-dimethylaminopyridine: a convenient source of positive cyanide for the synthesis of cyanoimidazoles

J. P. Whitten*, J. R. McCarthy, D. P. Matthews, *Synthesis*, 1988, (*6*), 470-472



R^1 = H, Me, Ph, Cl
R^2 = alkyl

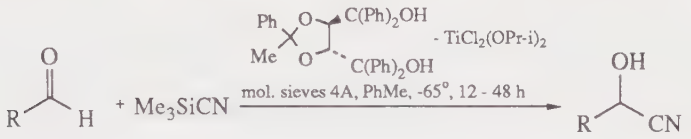
43 - 90 %
8 examples

34. Cyanotrimethylsilane

CAS Registry Number	7677-24-9
CAS Name	Silanecarbonitrile, trimethyl-
Molecular Formula	Me_3SiCN
Molecular Weight	99.21
Boiling Point	118-119°C
Melting Point	11-12°C
Density	0.744 kg/m^3
Refractive Index	1.3924
Safety and Handling	Highly toxic. Flammable liquid. Fp 1°C
Reactions	Cyanation.
Availability	Aldrich: 98%, ampoules, ££; 98%, under N_2 in Sure/Pac™ metal cylinders, £.

Asymmetric hydrocyanation of aldehydes with cyanotrimethylsilane promoted by chiral titanium reagent

K. Narasaka, T. Yamada, H. Minamikawa, *Chem. Lett.*, 1987, (*10*), 2073-2076

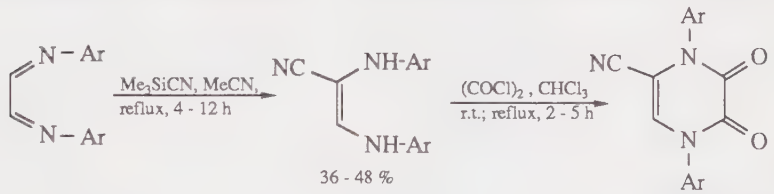


R = alkyl, aryl, cyclohexyl

66 - 89 %
68 - 90 % ee
5 examples

Preparation and cyclization of bis(arylamino)propenenitriles

M. Takahashi*, H. Miyahara, N. Yoshida, *Heterocycles*, 1988, **27**(*1*), 155-171

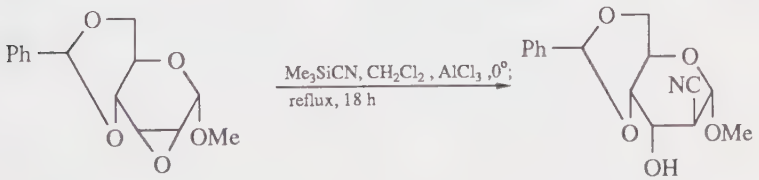


36 - 48 %

28 - 65 %
4 examples

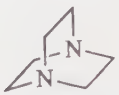
Regioselective one-pot synthesis of cyanodeoxy sugars

S. N.-ul-H. Kazmi, Z. Ahmed, A. Q. Khan, A. Malik*, *Synth. Commun.*, 1988, **18**(*2*), 151-156



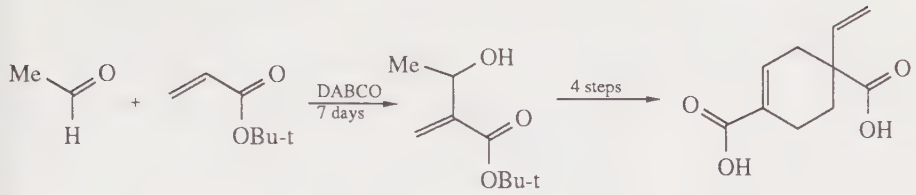
47 %
4 examples

35. 1,4-Diazabicyclo[2.2.2]octane (DABCO, Triethylenediamine, TED)

CAS Registry Number	280-57-9
CAS Name	1,4-Diazabicyclo[2.2.2]octane
Molecular Formula	
Molecular Weight	112.18
Boiling Point	Not available.
Melting Point	158-160°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Corrosive. Hygroscopic. Irritant.
Reactions	Forms crystalline complexes with organolithiums. Cleaves β-keto esters directly to ketones. Catalyst for condensation of acrylates with aldehydes. Useful additive in organometallic reactions.
Availability	Aldrich: 97%, p. Lancaster Synthesis: 97+%, p, bulk prices available. Sigma: p.

Mikanecic acid total synthesis

H. M. R. Hoffmann*, J. Rabe, *Helv. Chim. Acta*, 1984, **67**(2), 413-415

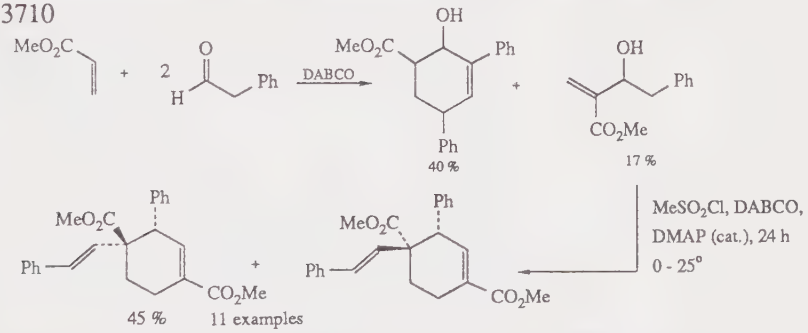


92 %

Mikanecic acid
24 % overall yield

Stereoselective generation and facile dimerization of hydroxymethylenealkanoic esters

W. Poly, D. Schomburg, H. M. R. Hoffmann*, *J. Org. Chem.*, 1988, **53**(*16*), 3701-3710



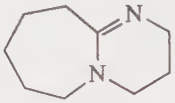
Stereoselective synthesis of α-methylene-β-hydroxy-γ-alkoxy esters and ketones

S. E. Drewes, T. Manickum, G. H. P. Roos*, *Synth. Commun.*, 1988, **18**(*10*), 1065-1070

R = CH_2Ph, CH_2OMe
R^1 = Me, Ph
R^2 = OMe, Me

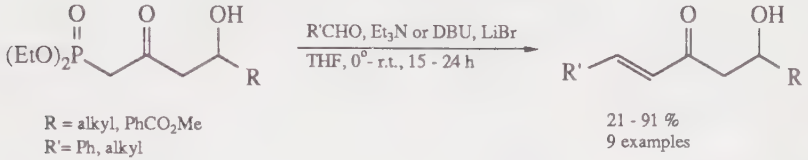
anti:syn 60:40 to 72:38
55 - 88 %
7 examples

36. 1,8-Diazabicyclo[5.4.0]undec-7-ene (DBU)

CAS Registry Number	6674-22-2
CAS Name	Pyrimido[1,2*a*]azepine, 2,3,4,6,7,8,9,10-octahydro-
Molecular Formula	
Molecular Weight	152.24
Boiling Point	80-83°/0.6 mmHg
Melting Point	Not available.
Density	1.018 kg/m^3
Refractive Index	1.5219
Safety and Handling	Corrosive. Moisture sensitive.
Reactions	Base in elimination reactions. Reduction. Review: *Synthesis*, 1972, 591.
Availability	Aldrich: 96%, p. Lancaster Synthesis: 97%, p. Sigma: approx. 97%, p.

Horner-Emmons olefination of hydroxyoxoalkylphosphonates and related compounds

O. Tsuge*, S. Kanemasa, N. Nakagawa, H. Suga, *Bull. Chem. Soc. Jpn.*, 1987, **60**(*11*), 4091-4098

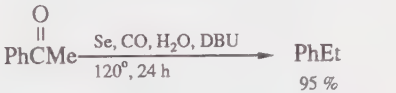


R = alkyl, $PhCO_2Me$
R'= Ph, alkyl

21 - 91 %
9 examples

Selenium-assisted reduction of aromatic ketones with carbon monoxide and water

Y. Nishiyama*, S. Hamanaka, A. Ogawa, N. Kambe, N. Sonoda*, *J. Org. Chem.*, 1988, **53**(*6*), 1326-1329



95 %
13 examples

Facile synthesis of *S*-alkyl carbonothioates via direct *O*-carbonylation of alcohols

T. Mizuno*, I. Nishiguchi, T. Hirashima, A. Ogawa, N. Kambe, N. Sonoda, *Tetrahedron Lett.*, 1988, **29**(*37*), 4767-4768

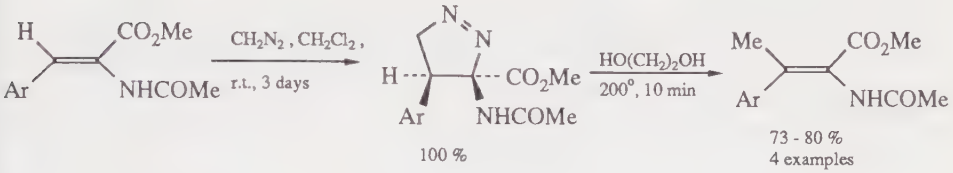
86 %
12 examples

37. Diazomethane

CAS Registry Number	334-88-3
CAS Name	Methane, diazo-
Molecular Formula	CH_2N_2
Molecular Weight	42.04
Boiling Point	~0°C
Melting Point	-145°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Extreme risk of explosion by shock, friction, contact with ground glass surfaces, fire or other sources of ignition. Toxic by inhalation.
Reactions	Methylation. Methylenation. Reviews: *Aldrichim. Acta*, 1970, **3**(*4*), 9-12; 1983, **16**(*1*), 3-10.
Availability	Not commercially available.
Preparation	Aldrich supply a variety of kits with which to prepare diazomethane in quantities of ~100 mmol to larger scale (eg. 0.2-0.3 mol). The distillation glassware used with Diazald®(*N*-methyl-*N*-nitroso-*p*-toluenesulphonamide) is supplied with nonground joints: the use of MNNG (1-methyl-3-nitro-1-nitrosoguanidine) as precursor allows the preparation of diazomethane without distillation. Further details: Aldrich catalogue, 1988-1989, pp. 2034-2036.

Synthesis of methyl acetamidoaryl butenoates in two highly selective steps

C. Cativiela*, M. D. Diaz de Villegas, E. Melendez, *Synthesis*, 1986, (5), 418-419

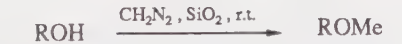


100 %

73 - 80 %
4 examples

Methylation of alcohols and phenols adsorbed on silica gel with diazomethane

H. Ogawa, T. Hagiwara, T. Chihara, S. Teratani*, K. Taya, *Bull. Chem. Soc. Jpn.*, 1987, **60**(2), 627-629

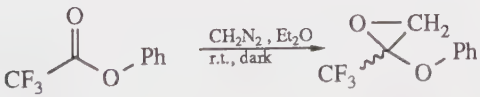


R = alkyl, aryl

79 - 99 %
13 examples

Oxiranes from methylenation of esters by diazomethane

P. Strazzolini, G. Verardo, A. G. Giumanini*, *J. Org. Chem.*, 1988, **53**(*14*), 3321-3325



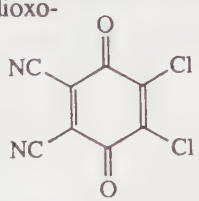
40 - 89 %
21 examples

38. 2,3-Dichloro-5,6-dicyanobenzoquinone (DDQ)

CAS Registry Number 84-58-2

CAS Name 1,4-Cyclohexadiene-1,2-dicarbonitrile, 4,5-dichloro-3,6-dioxo-

Molecular Formula



Molecular Weight 227.01

Boiling Point Not available.

Melting Point 213-216°C

Density Not available.

Refractive Index Not available.

Safety and Handling Harmful.

Reactions Dehydrogenation reagent. Oxidation. Aromatization. Reviews: *Chem. Rev.*, 1967, **67**, 153; 1978, **78**, 317.

Availability Aldrich: 98%, £.

Lancaster Synthesis: 98+%, £, bulk prices available.

Sigma: orange-yellow crystals, £.

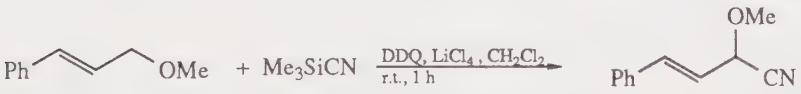
Oxidative cyclization of (hydroxyalkyl)furans with DDQ

L. M. Harwood*, J. Robertson, *Tetrahedron Lett.*, 1987, **28**(*43*), 5175-5176

60 %
6 examples

Oxidative carbon-carbon bond formation by reaction of allyl ethers, silyl carbon nucleophiles and DDQ

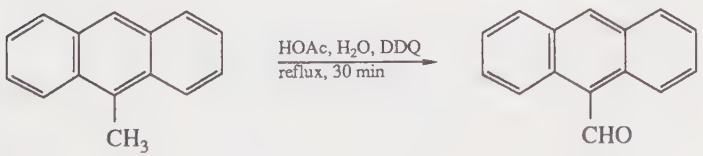
Y. Hayashi, T. Mukaiyama, *Chem. Lett.*, 1987, (*9*), 1811-1814



82 %
15 examples

DDQ in aqueous acetic acid, a convenient new reagent for the synthesis of aryl ketones and aldehydes via benzylic oxidation of arylalkanes

H. Lee, R. G. Harvey*, *J. Org. Chem.*, 1988, **53**(*19*), 4587-4589



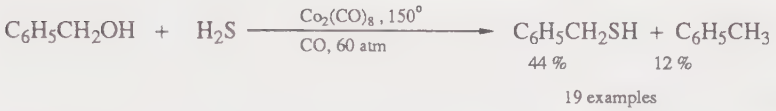
90 %
15 examples

39. Dicobalt octacarbonyl

CAS Registry Number	10210-68-1
CAS Name	Cobalt, di-μ-carbonylhexacarbonyldi-, (Co-Co)
Molecular Formula	$[Co(CO)_4]_2$
Molecular Weight	341.95
Boiling Point	52°C (dec.)
Melting Point	51°C
Density	1.73 kg/m^3
Refractive Index	Not available.
Safety and Handling	Air sensitive.
Reactions	Carbonylation.
Availability	Not commercially available.
Preparation	Prepared by treating $CoCO_3$ with carbon monoxide and hydrogen at 250 -300 atm and 120-200°C.
Other Preparations	*Magy. Asvanyolaj-Foldgaz Kiserl. Intez. Kozl.*, 1966, (*7*), 75-87.

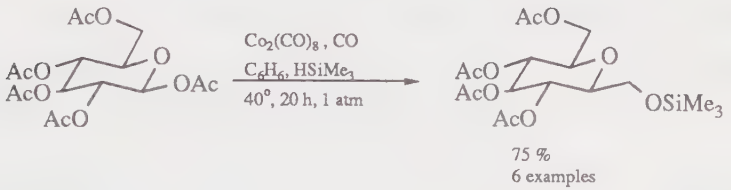
Dicobalt octacarbonyl catalyzed conversion of benzylic alcohols to thiols, hydrocarbons and esters

H. Alper*, F. Sibtain, *J. Org. Chem.*, 1988, **53**(*14*), 3306-3309



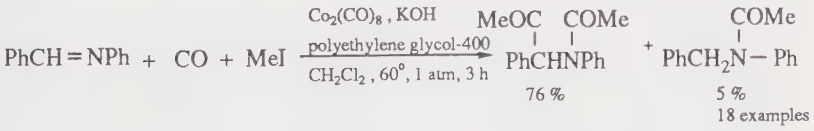
Stereoselective siloxymethylation of glycosyl acetates

N. Chatani, T. Ikeda, T. Sano, N. Sonoda, H. Kurosawa, Y. Kawasaki, S. Murai*, *J. Org. Chem.*, 1988, **53**(*14*), 3387-3389



Novel direct diacylation of Schiff bases

G. Vasapollo, H. Alper*, *Tetrahedron Lett.*, 1988, **29**(*40*), 5113-5116

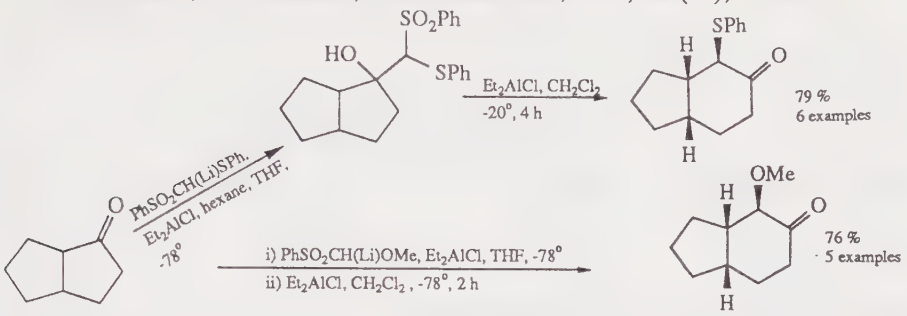


40. Diethylaluminium chloride

CAS Registry Number	96-10-6
CAS Name	Aluminum, chlorodiethyl
Molecular Formula	Et_2AlCl
Molecular Weight	120.56
Boiling Point	125-126°C/50 mmHg
Melting Point	-50°C
Density	0.961 kg/m^3
Refractive Index	Not available.
Safety and Handling	Pyrophoric. Moisture sensitive.
Reactions	Ring enlargement. Ene reaction catalyst. Cycloaddition. Reagent for aldol condensation: *J. Am. Chem. Soc.*, 1977, **99**, 7705.
Availability	Aldrich: under N_2 in Sure/Pac™ cylinders), p; 1M in hexanes under N_2 in Sure/Pac™ cylinders or Sure/Seal™ bottles, p; 1.8M in PhMe under N_2 in Sure/Seal™ cylinders or Sure/Seal™ bottles, p.

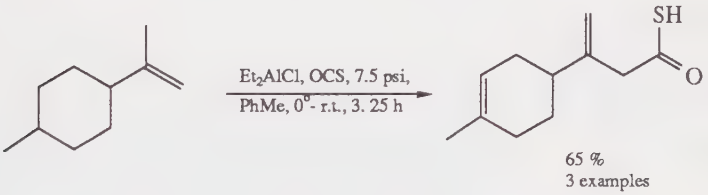
Ring expansion of ketones to α-methoxy and β-phenylthio ketones

B. M. Trost*, G. K. Mikhail, *J. Am. Chem. Soc.*, 1987, **109**(*13*), 4124-4127



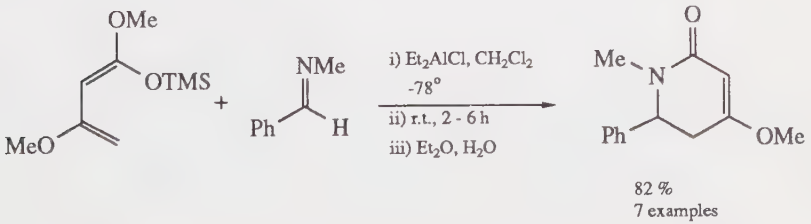
Dialkylaluminium chloride catalyzed ene reactions of carbonyl sulphide

L. V. Dunkerton*, M. Susa, *Synth. Commun.*, 1987, **17**(*10*), 1217-1225



Rapid and efficient cycloaddition of simple imines with activated dienes to give lactams

M. M. Midland*, J. I. McLoughlin, *Tetrahedron Lett.*, 1988, **29**(*37*), 4653-4656

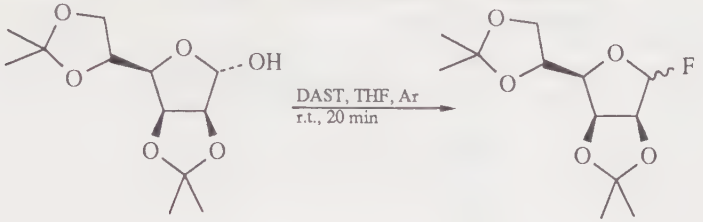


41. Diethylaminosulphur trifluoride (DAST)

CAS Registry Number	38078-09-0
CAS Name	Sulfur, (*N*-ethylethanaminato)trifluoro-
Molecular Formula	Et_2NSF_3
Molecular Weight	161.19
Boiling Point	30-32°C/3 mmHg
Melting Point	Not available.
Density	1.220 kg/m^3
Refractive Index	Not available.
Safety and Handling	Corrosive. Moisture sensitive.
Reactions	Fluorinating agent prepared by reaction of Et_2NSiMe_3 with SF_4 in $FCCl_3$ or Et_2O at -78°: *Synthesis*, 1973, (*12*), 787-789; *J. Org. Chem.*; 1975, **40**(*5*), 574-578. Reviews: *Org. React.*, 1974, **21**, 1; 1985, **34**, 319.
Availability	Aldrich; ££. Lancaster Synthesis: ££, bulk prices available. Sigma: Inquire for details.

Preparation of glycosyl fluorides from monosaccharide hemiacetal using DAST

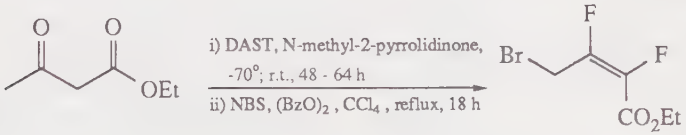
G. H. Posner*, S. R. Haines*, *Tetrahedron Lett.*, 1985, **26**(*1*), 5-8



87 % α, 13 % β
7 examples

Preparation of vicinal difluoroolefinic carbonyl compounds

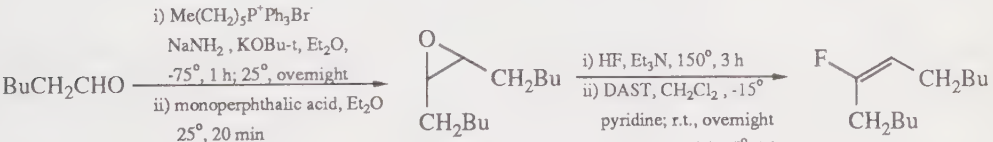
A. E. Asato*, R. S. H. Liu*, *Tetrahedron Lett.*, 1986, **27**(*29*), 3337-3340



4 examples

Stereocontrolled access to and hydrogen fluoride abstraction from vicinal difluoroalkanes

T. Hamatani, S. Matsubara, H. Matsuda, M. Schlosser*, *Tetrahedron*, 1988, **44**(*10*), 2865-2874, 2875-2881

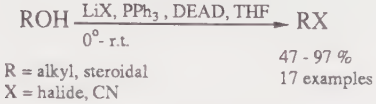


42. Diethyl azodicarboxylate (DEAD)

CAS Registry Number	1972-28-7
CAS Name	Diazenecarboxylic acid diethyl ester
Molecular Formula	$EtO_2CN{=}NCO_2Et$
Molecular Weight	174.16
Boiling Point	$106^{\circ}C$/13 mm Hg
Melting Point	Not available.
Density	1.106 kg/m^3
Refractive Index	1.4220
Safety and Handling	Light sensitive.
Reactions	Dienophile. Oxidizing agent. Condensation agent.
Availability	Aldrich: 98%, £. Sigma: £.

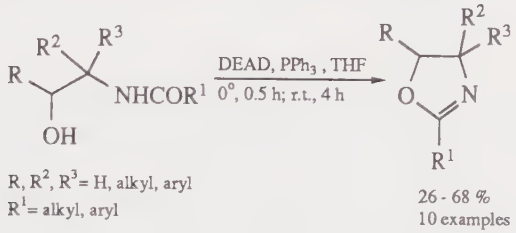
Preparation of alkyl halides and cyanides from alcohols

S. Manna, J. R. Falck*, C. Mioskowski, *Synth. Commun.*, 1985, **15**(*8*), 663-668



A mild procedure for the preparation of 2-oxazolines

D. M. Roush*, M. M. Patel, *Synth. Commun.*, 1985, **15**(*8*), 675-679



A facile synthesis of diethyl (phenylthio)alkylphosphonates

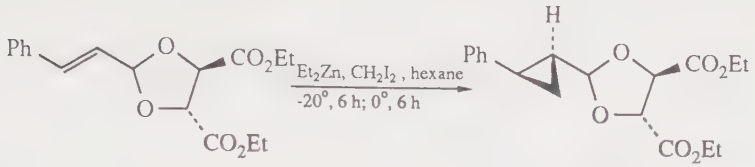
T. Gajda, *Synthesis*, 1988, (*4*), 327-328

43. Diethylzinc

CAS Registry Number	557-20-0
CAS Name	Zinc, diethyl-
Molecular Formula	Et_2Zn
Molecular Weight	123.49
Boiling Point	117°C
Melting Point	-28°C
Density	1.205 kg/m^3
Refractive Index	1.4983
Safety and Handling	Pyrophoric. Corrosive. Reacts violently with water, CH_2Cl_2/alkene mixtures, MeOH, halogens or SO_2.
Reactions	Conjugate addition. Nucleophilic transfer of ethyl group. Useful reagent for preparation of carbenes in combination with diiodoalkanes.
Availability	Aldrich: p; 1M in hexanes, p; 1M in PhMe, p; all under N_2 in Sure/Pac™ cylinders or Sure/Seal™ bottles.

Asymmetric cyclopropanation via a Simmons-Smith reaction

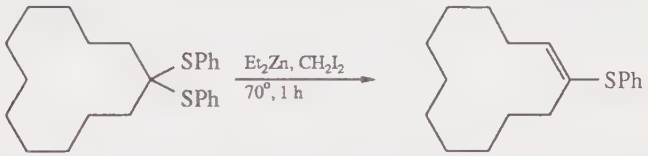
I. Arai, A. Mori, H. Yamamoto*, *J. Am. Chem. Soc.*, 1985, **107**(*26*), 8254-8256



91 % yield
87 % d.e.
10 examples

A convenient synthesis of vinyl sulphides

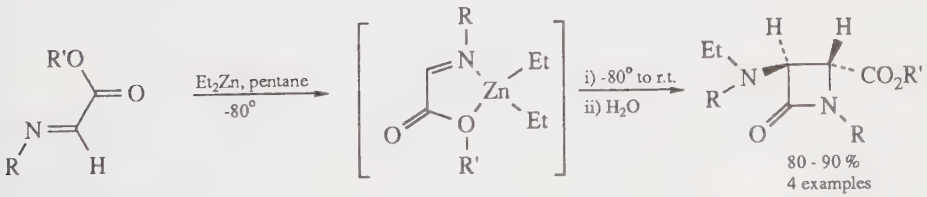
A. D. Rodriguez, A. Nikon*, *Tetrahedron*, 1985, 41(*20*), 4443-4448



92 %
73:27 mixture of isomers
6 examples

Syntheses of *trans*-β-lactams by reaction of α-imino esters with diethylzinc

M. R. P. van Vliet, J. T. B. H. Jastrzebski, W. J. Kaver, K. Goubitz, G. van Koten*, *Recl. Trav. Chim. Pays-Bas*, 1987, **106**(*4*), 132-134



R, R' = alkyl

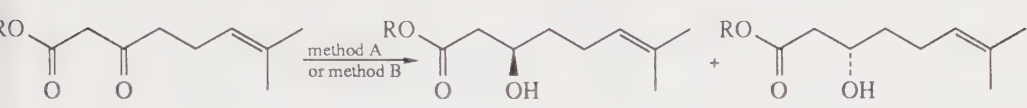
80 - 90 %
4 examples

44. Diisobutylaluminium hydride (DIBAL)

CAS Registry Number	1191-15-7
CAS Name	Aluminium, hydrobis(2-methylpropyl)-
Molecular Formula	$(Me_2CHCH_2)_2AlH$
Molecular Weight	142.22
Boiling Point	116-118°C/1 mmHg
Melting Point	Not available.
Density	0.798 kg/m^3
Refractive Index	Not available.
Safety and Handling	Pyrophoric. Moisture sensitive.
Reactions	Reduction. Hydroalumination. Review: K. Maruoka, H. Yamamoto, *Angew. Chem. (Int. Ed. Engl.)*, 1985, **24**(*8*), 668-682.
Availability	Aldrich: p; 1M in PhMe, p; all under N_2 in Sure/Pac™ cylinders, Sure/Seal™ bottles or Kilo-Lab™ cylinders. Kilo-Lab cylinders require deposit. Also available in cyclohexane, CH_2Cl_2, heptane, hexanes, THF.

Enantioselective synthesis of dialkyl alcohols

D. F. Taber*, P. B. Deker, M. D. Gaul, *J. Am. Chem. Soc.*, 1987, **109**(*24*), 7488-7494



1-Np = 1-naphthyl

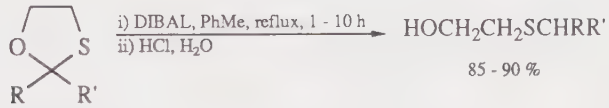
method A: $Zn(BH_4)_2$, $ZnCl_2$, PhMe, -78°, 0.5 - 3 h : 94 % yield, 92:8 mixture

method B: DIBAL, PhMe, -78°, 0.5 h; -65 to -60°, 1.5 h : 82 % yield, 4:96 mixture

---

Cleavage of oxathiolanes with diisobutylaluminium hydride

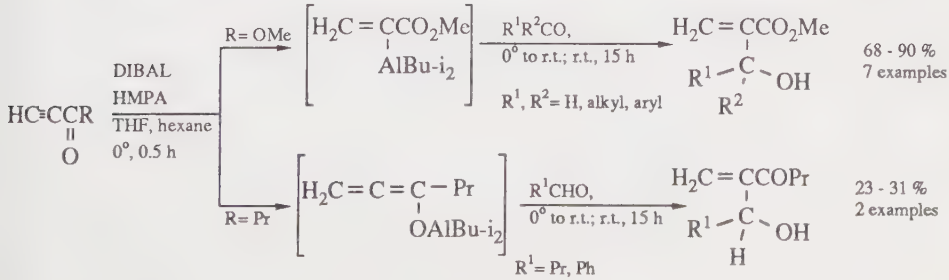
T. K. Kiladze, B. A. Kirilyuk, I. A. Mel'nitskii, V. V. Duoryanchikov, E. A. K. Kantor, D. L. Rakhmankulov, *Chem. Heterocycl. Compd. (Engl. Transl.)*, 1987, **23**(*4*), 471



R, R'= H, Me

Generation of [α-(alkoxycarbonyl)vinyl]aluminium and aluminium allenolates by the hydroalumination of α,β-acetylenic carbonyl compounds and their reaction with carbonyl compounds

T. Tsuda*, T. Yoshida, T. Saegusa*, *J. Org. Chem.*, 1988, **53**(*5*), 1037-1040

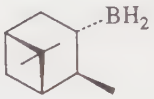


45. Diisopinocampheylborane

CAS Registry Number 21932-54-7

CAS Name Borane, bis(2,6,6-trimethylbicyclo[3.1.1]hept-3yl)-

Molecular Formula



Molecular Weight 286.31

Boiling Point Not available.

Melting Point Not available.

Density Not available.

Refractive Index Not available.

Safety and Handling Not available.

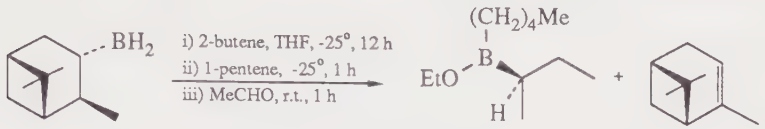
Reactions Asymmetric hydroboration. Oxidation.
Reviews: D. S. Matteson, *Synthesis*, 1986, (*12*), 973-985; M. Srebnik, P. V. Ramachandran, *Aldrichimica Acta*, 1987, **20**(*1*), 9-24; H. C. Brown, B. Singaram, *Acc. Chem. Res.*, 1988, **21**(*8*), 287-293.

Availability Not commercially available.

Preparation H. C. Brown, G. Zweifel, *J. Am. Chem. Soc.*, 1961, **83**, 486.

Synthesis of chiral boronic and borinic esters via asymmetric hydroboration of alkenes

H. C. Brown*, P. K. Jadhav, M. C. Desai, *Tetrahedron*, 1984, **40**(*8*), 1325-1332



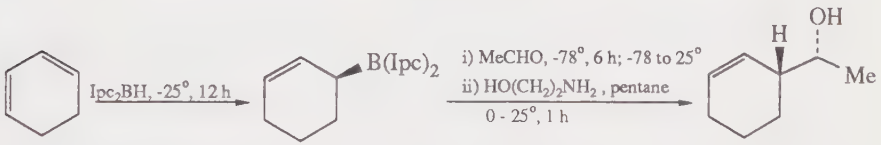
75 %
73 % e.e.

67 %
99 % e.e.

5 examples

Asymmetric synthesis of cyclohexenyl alkanols via a stereochemically stable allyl borane

H. C. Brown*, P. K. Jadhav, K. S. Bhat, *J. Am. Chem. Soc.*, 1985, **107**(*8*), 2564-2565



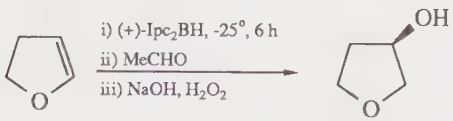
Ipc = isopinocampheyl

92 % selectivity

64 %
94 % e.e.

Asymmetric hydroboration of heterocyclic alkenes with diisopinocampheylborane

H. C. Brown*, J. V. N. V. Prasad, *J. Am. Chem. Soc.*, 1986, **108**(*8*), 2049-2054



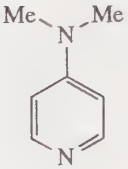
(S)- 87 %
100 % e.e
13 examples

46. 4-Dimethylaminopyridine (DMAP)

CAS Registry Number 1122-58-3

CAS Name 4-Pyridinamine, *N*,*N*-dimethyl-

Molecular Formula



Molecular Weight 122.17

Boiling Point Not available.

Melting Point 108-110°C

Density Not available.

Refractive Index Not available.

Safety and Handling Highly toxic. Corrosive. Irritant.

Reactions Hypernucleophilic acylation catalyst for hindered alcohols.
Reviews: *Angew. Chem.*, 1978, **90**(*8*), 602; *Angew. Chem. (Int. Ed. Engl.)*; 1978, **17**, 569; *Chem. Soc. Rev.*, 1983, **12**, 129.

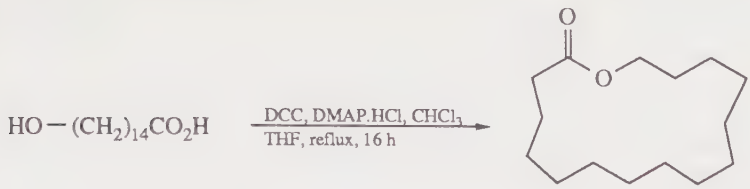
Availability Aldrich: 99%, p.

Lancaster Synthesis: 99%, p, bulk prices available.

Sigma: off-white to yellow crystals, £.

A very practical new method for macrolactonization

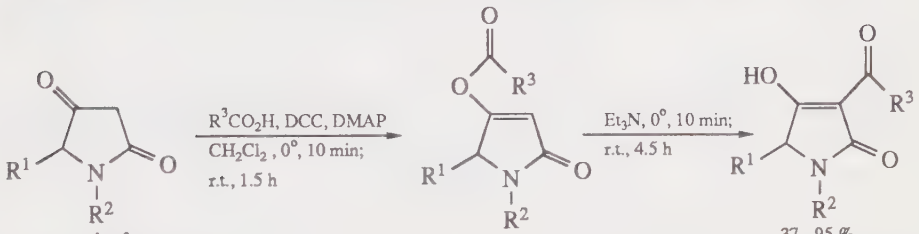
E. P. Boden, G. E. Keck*, *J. Org. Chem.*, 1985, **50**(*13*), 2394-2395



95 %
4 examples

Acylation of tetramic acids

K. Hori, M. Arai, K. Nomura, E. Yoshii*, *Chem. Pharm. Bull.*, 1987, **35**(*10*), 4368-4371

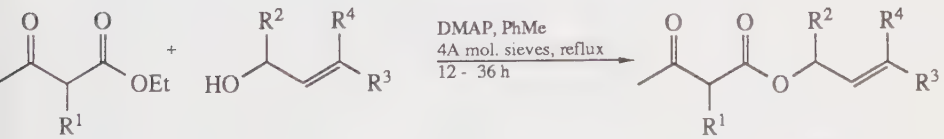


R^1, R^2 = H, alkyl
R^3 = alkyl, vinyl

37 - 95 %
17 examples

Transesterification of oxo esters with allyl alcohols

J. C. Gilbert*, T. A. Kelly, *J. Org. Chem.*, 1988, **53**(*2*), 449-450



R^1 - R^4 = H, Me

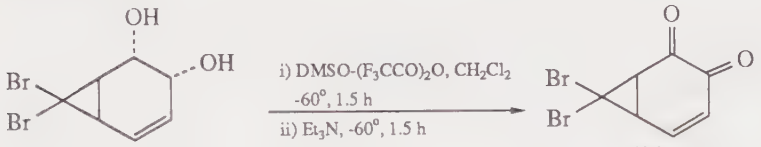
32 - 96 %
9 examples

47. Dimethyl sulphoxide (DMSO)

CAS Registry Number	67-68-5
CAS Name	Methane, sulfinylbis-
Molecular Formula	Me_2SO
Molecular Weight	78.13
Boiling Point	189°C
Melting Point	18.4°C
Density	1.101 kg/m^3
Refractive Index	1.4787
Safety and Handling	Hygroscopic. Violent reaction with oxidants, active halogen compounds, metal hydrides. Harmful if swallowed. Irritating to eyes. Fp 95°C
Reactions	Oxidizing agent. Solvent for many inorganic ions. Review: *Bull. Soc. Chim. Fr.*, 1965, 1021. Forms, on reaction with NaH, dimsyl sodium, strong base for conversion of phosphonium salts to phosphoranes.
Availability	Aldrich: 99.9%, HPLC grade (800 ml unit in Sure-Seal™ bottle), p; 99.9% spectrophotometric grade, p; anhydrous, 99+%, under N_2 in Sure/Seal™ bottles, p; 99+%, p. Also available as $(CD_3)_2SO$, 100.0 atom % D, £££; 99.9 atom % D (contains 0.03% v/v TMS: useful for FT-NMR work), £. Lancaster Synthesis: 99+%, p, bulk prices available. Sigma: 99+%, p; ACS reagent, p.

Oxidation of vicinal diols to α-dicarbonyl compounds by trifluoroacetic anhydride-activated DMSO

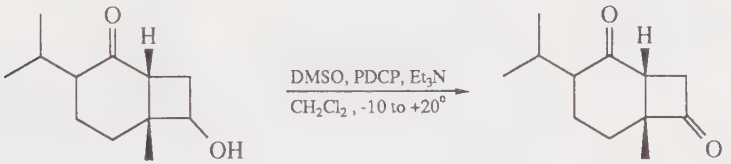
C. M. Amon, M. G. Banwell*, G. L. Gravatt, *J. Org. Chem.*, 1987, **52**(*22*), 4851-4855



68 %
11 examples

The use of phenyl dichlorophosphate as an activating agent in the Pfitzner-Moffat oxidation of alcohols

H.-J. Liu*, J. M. Nyangulu, *Tetrahedron Lett.*, 1988, **29**(*26*), 3167-3170

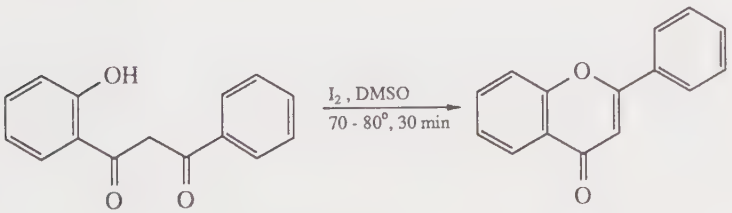


PDCP = phenyldichlorophosphate

84 %
11 examples

Iodine-DMSO: a useful reagent for the conversion of 2-hydroxydibenzoylmethanes into flavones

J. K. Makrandi, V. Kumari, *Chem. Ind. (London)*, 1988, (*19*), 630



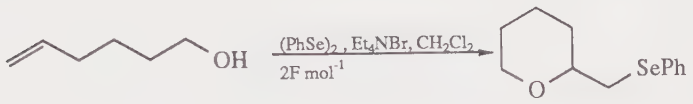
90 %
6 examples

48. Diphenyl diselenide

CAS Registry Number	1666-13-3
CAS Name	Diselenide, diphenyl
Molecular Formula	Ph_2Se_2
Molecular Weight	312.13
Boiling Point	Not available.
Melting Point	61-63°C
Density	1.557 kg/m^3
Refractive Index	Not available.
Safety and Handling	Highly toxic. Stench.
Reactions	Reagent for introduction of unsaturation. Reviews: *Tetrahedron*, 1978, **34**, 1049; *Acc. Chem. Res.*, 1979, **12**, 22; 1984, **17**, 28.
Availability	Aldrich: 99%, ££. Lancaster Synthesis: 98%, ££, bulk prices available.

Electrochemical phenylselenoetherification of enols

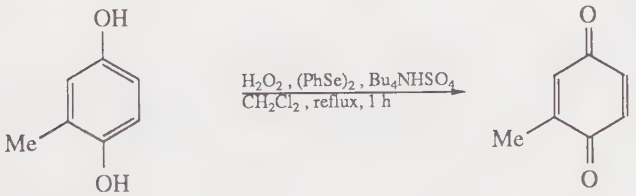
M. L. Mihailovic*, S. Konstantinovic, R. Vukicevia, *Tetrahedron Lett.*, 1987, **28**(*37*), 4343-4346



75 %
13 examples

Practical large-scale oxidation of hydroquinones to benzoquinones with hydrogen peroxide/diphenyl diselenide

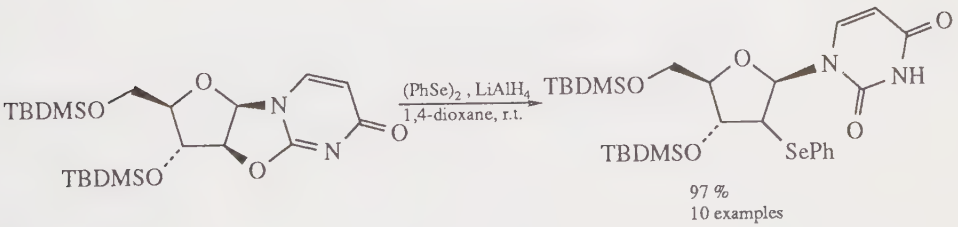
D. V. Pratt, F. Ruan, P. B. Hopkins*, *J. Org. Chem.*, 1987, **52**,(*22*), 5053-5055



82 %
7 examples

Cleavage of cyclic ethers by phenylselenide anion

K. Haraguchi, H. Tanaka, H. Hayakawa, T. Miyasaka*, *Chem. Lett.*, 1988, (*6*), 931-934



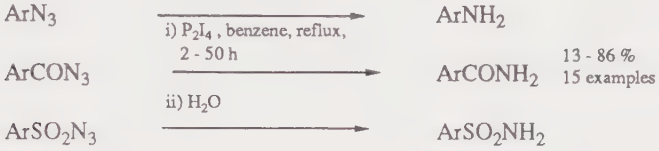
97 %
10 examples

49. Diphosphorus tetraiodide

CAS Registry Number	13455-00-0
CAS Name	Hypodiphosphorous tetraiodide
Molecular Formula	I_2PPI_2
Molecular Weight	569.57
Boiling Point	Not available.
Melting Point	125°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Corrosive. Light sensitive.
Reactions	Reagent for regioselective synthesis of alkyl iodides from alcohols. Reviews: H. Suzuki, H. Tani, *J. Synth. Org. Chem. Jpn.*, 1985, **43**(1), 76-83; *CA*, 203975t, Application of, in organic synthesis.
Availability	Aldrich: (under Ar), ££.

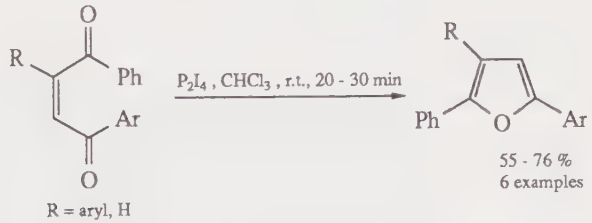
Reductive cleavage of aromatic azido, azo, azoxy and hydrazo compounds with diphosphorus tetraiodide

H. Suzuki*, H. Tani, S. Ishida, *Bull. Chem. Soc. Jpn.*, 1985, **58**(*6*), 1861-1862



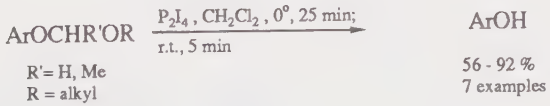
Synthesis of furans from enediones by diphosphorus tetraiodide

S. H. Demirdji, M. J. Haddadin, C. H. Issidorides*, *J. Heterocyclic Chem.*, 1985, **22**(2), 495-496



Hydrolysis of alkoxymethyl aryl ethers to give hydroxy arenes

H. Saimoto, Y. Kusano, T. Hiyama*, *Tetrahedron Lett.*, 1986, **27**(*14*), 1607-1610

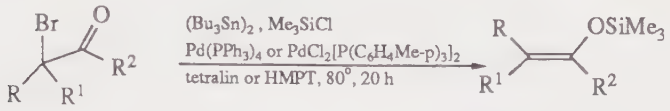


50. Hexabutylditin (Bis(tributyltin))

CAS Registry Number	813-19-4
CAS Name	Distannane, hexabutyl-
Molecular Formula	$[Me(CH_2)_3]_3Sn)_2$
Molecular Weight	580.08
Boiling Point	197-198°C/10 mmHg
Melting Point	Not available.
Density	1.148 kg/m^3
Refractive Index	1.5120
Safety and Handling	Moisture sensitive. Toxic.
Reactions	For the photodesulphurization of 1,3-dithiole-2-thiones to tetrathiafulvalenes: *J. Am. Chem. Soc.*, 1976, **98**, 7440. For preparation of tributylstannyllithiums. Reviews: *Chem. Rev.*, 1960, **60**, 459; *Chem. Ind. (London)*, 1972, 490.
Availability	Aldrich: 97%, £. Lancaster Synthesis: 98+%, £, bulk prices available.

Palladium-catalyzed coupling reaction of α-bromo ketones with hexabutylditin

M. Kosugi*, M. Koshiba, H. Sano, T. Migata*, *Bull. Chem. Soc. Jpn.*, 1985, **58**(*3*), 1075-1076

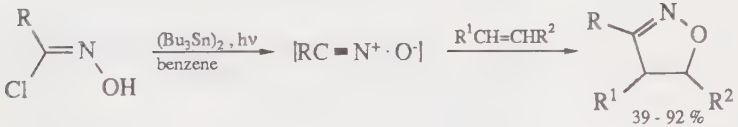


49 - 81 %
8 examples

R, R^1 = H, Me
R^2 = alkyl, Ph, OEt

Reaction of hydroximic chlorides with hexabutylditin: generation and cycloaddition of nitrile oxides

B. H. Kim, *Synth. Commun.*, 1987, **17**(*10*), 1199-1206

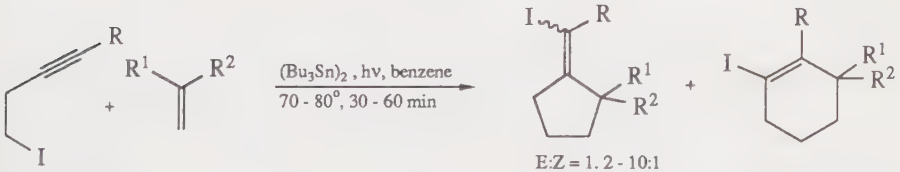


39 - 92 %
14 examples

R = Ph, Et, t-Bu
R^1, R^2 = H, alkyl, aryl

Atom transfer cycloaddition. Methylenecyclopentane synthesis

D. P. Curran*, M.-H. Chen, *J. Am. Chem. Soc.*, 1987, **109**(*21*), 6558-6560



E:Z = 1. 2 - 10:1

exo:endo 7:1 - 1:0
total yield 27 - 68 %

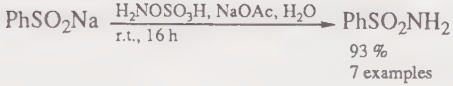
R = $SiMe_3$, H
R^1 = H, alkyl
R^2 = CO, CN, SO_2Ph

51. Hydroxylamine-*O*-sulphonic acid

CAS Registry Number	2950-43-8
CAS Name	Hydroxylamine-*O*-sulfonic acid
Molecular Formula	H_2NOSO_3H
Molecular Weight	113.09
Boiling Point	Not available.
Melting Point	210°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Corrosive. Hygroscopic. Irritant. Keep cold.
Reactions	Versatile reagent for amination, hydroxymethylation. Reviews: *Aldrichim. Acta*, 1980, **13**, 3; *Org. Prep. Proced. Int.*, 1982, **14**, 265.
Availability	Aldrich: 97%, p; tech. grade, 90%, p. Lancaster Synthesis: p, bulk prices available. Sigma: light tan crystals, approx. 95%, p.

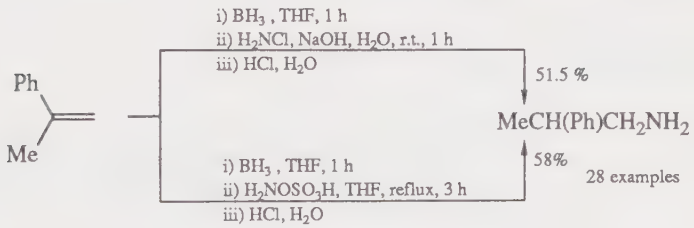
Preparation of primary sulphonamides by reaction of sulphinic acid salts with hydroxylamine-*O*-sulphonic acid

S. L. Granam, T. H. Scholz, *Synthesis*, 1986, (*12*), 1031-1032



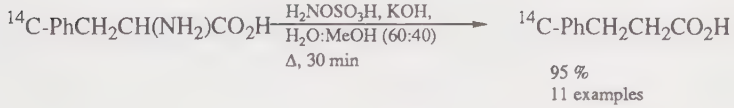
Synthesis of amines from alkenes via organoboranes

H. C. Brown*, K.-W. Kim, M. Srebnik, B. Singaram, *Tetrahedron*, 1987, **43**(*18*), 4071-4078



Improved synthesis of ^{14}C-labelled carboxylic acids from ^{14}C-labelled amino acids by reaction with hydroxylamine-*O*-sulphonic acid

T. V. Ramamurthy*, S. Ravi, K. V. Viswanathan, *J. Labelled Compd. Radiopharm.*, 1988, **25**(*8*), 809-814

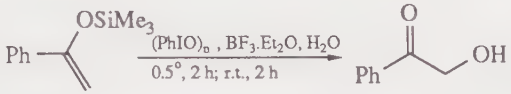


52. Iodosylbenzene

CAS Registry Number	536-80-1
CAS Name	Benzene, iodosyl-
Molecular Formula	$(PhIO)_n$
Molecular Weight	220.01 (PhIO)
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Explodes at 210°C.
Reactions	Oxidation. Reviews: A. Varvoglis, *Synthesis*, 1984, (*9*), 709-726; R. M. Moriarty, O. Prakash, *Acc. Chem. Res.*, 1986, **19**(*8*), 244-250.
Availability	Not commercially available.
Preparation	Prepared by reaction of iodosylbenzene diacetate with 3N sodium hydroxide under vigorous stirring followed by trituration of the solid formed: *Org. Synth., Coll. Vol. 5*, 658.

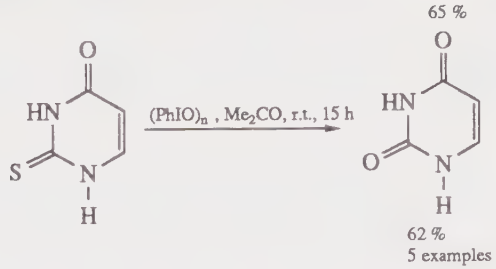
Hypervalent iodine oxidation of silyl enol ethers to α-hydroxy ketones

R. M. Moriarty*, M. P. Duncan, O. Prakash, *J. Chem. Soc., Perkin Trans. 1*, 1987, (*8*), 1781-1784



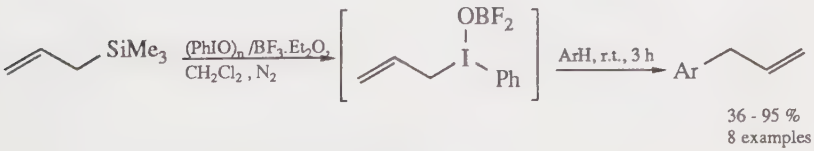
Conversion of thiocarbonyl into carbonyl in uracil, uridine, and *Escherichia coli* tRNA by hypervalent iodine oxidation

R. M. Moriarty*, I. Prakash, D. E. Clarisse, R. Penmasta, A. K. Awasthi, *J. Chem. Soc., Chem. Commun.*, 1987, (*16*), 1209-1210



Allylation of aromatic compounds with allyltrimethylsilane using a hypervalent organoiodine compound

K. Lee, D. Y. Kim, D. Y. Oh*, *Tetrahedron Lett.*, 1988, **29**(*6*), 667-668

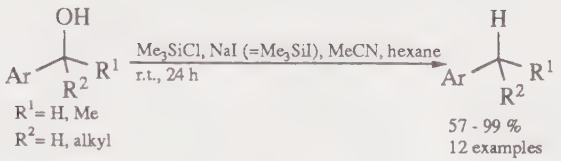


53. Iodotrimethylsilane

CAS Registry Number	16029-98-4
CAS Name	Silane, iodotrimethyl-
Molecular Formula	Me_3SiI
Molecular Weight	200.10
Boiling Point	106°C
Melting Point	Not available.
Density	1.406 kg/m^3
Refractive Index	1.4710
Safety and Handling	Flammable liquid. Corrosive. Keep cold. Fp -31°C
Reactions	Efficient reagent for ether and ester cleavage under neutral conditions. Reviews: *Aldrichim. Acta*, 1981, **14**(2), 31; *Synthesis*, 1980, 861; *Tetrahedron*, 1982, **38**, 2225.
Availability	Aldrich: 97%, £. Lancaster Synthesis: 98+%, £, bulk prices available. Sigma: 90-95%, £. Stabilized with copper.

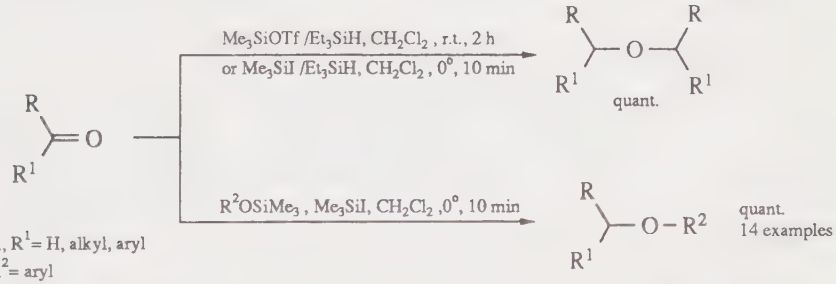
Reduction of benzylic alcohols

T. Sakai*, K. Miyata, M. Utaka, A. Takeda, *Tetrahedron. Lett.*, 1987, **28**(*33*), 3817-3818



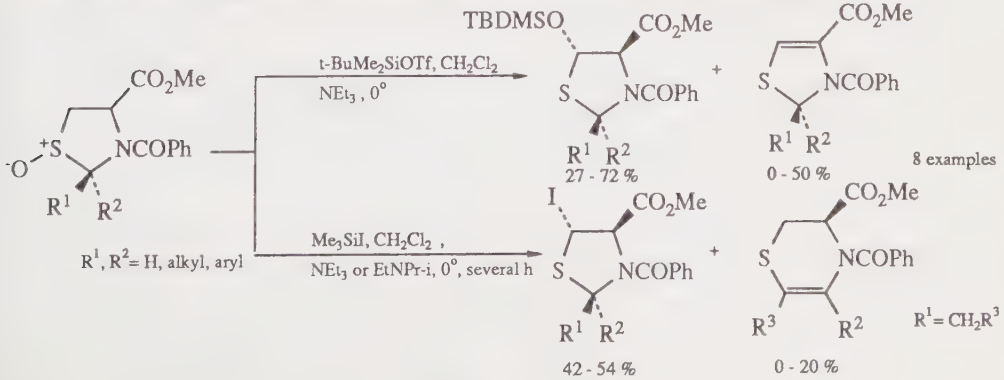
Trimethylsilyl iodide-catalyzed reductive coupling of carbonyl compounds with trialkylsilanes to give ethers

M. B. Sassaman, K. D. Kotian, G. K. S. Prakash, G. A. Olah*, *J. Org. Chem.*, 1987, **52**(*19*), 4314-4319



Stereospecific functionalization of thiazolidine via silicon Pummerer reaction of thiazolidine *S*-oxides

N. Tokitoh, Y. Igurashi, W. Ando*, *Tetrahedron Lett.*, 1987, **28**(*47*), 5903-5906

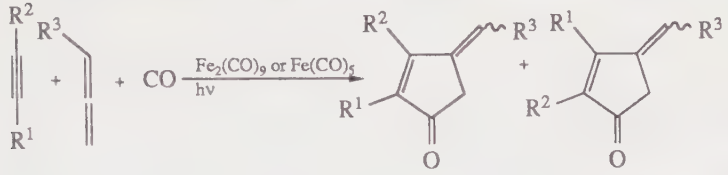


54. Iron pentacarbonyl

CAS Registry Number	13463-40-6
CAS Name	Iron, pentacarbonyl-
Molecular Formula	$Fe(CO)_5$
Molecular Weight	195.90
Boiling Point	103°C
Melting Point	-20°C
Density	1.490 kg/m^3
Refractive Index	1.5196
Safety and Handling	Highly toxic. Flammable liquid. Fp -15°C
Reactions	Catalyst for addition, cycloaddition, reduction.
Availability	Aldrich: p.

β-Methylenecyclopentenones via iron carbonyl-induced [2+2+1]cycloaddition of alkynes to allenes and carbon monoxide

R. Aumann*, H.-J. Weidenhaupt, *Chem. Ber.*, 1987, **120**(*1*), 23-27

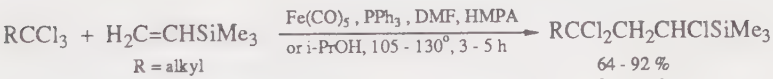


R, R^1 = H, Ph
R^2 = H, Ph, CH_2Ph

18 - 56 %
7 examples

Addition of trichloroalkanes to vinyltrimethylsilane in the presence of iron pentacarbonyl

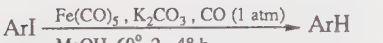
A. A. Kamyshova, V. I. Dostrovalova, E. T. Chukhovskaya, *Bull. Acad. Sci. USSR, (Engl. Transl.)*, 1987, **36**(*5,2*), 1087-1089



64 - 92 %
2 examples

Catalytic reduction of aryl iodides catalyzed by iron pentacarbonyl

J.-J. Brunet*, M. Taillifer, *J. Organomet. Chem.*, 1988, **348** (*1*),C5-C8



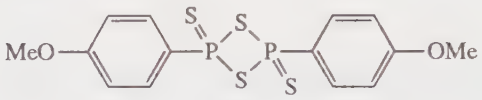
25 - 100 %

55. Lawesson's Reagent (*p*-Methoxyphenylthionophosphine sulphide dimer)

CAS Registry Number 19172-47-5

CAS Name 2,4-Bis(4-methoxyphenyl)-1,3-dithia-2,4-diphosphetane-2,4-disulphide

Molecular Formula



Molecular Weight 404.47

Boiling Point Not available.

Melting Point 227/228-229°C

Density Not available.

Refractive Index Not available.

Safety and Handling Moisture sensitive. Stench.

Reactions Thiation agent: *Bull. Soc. Chim. Belg.*, 1978, **87**(*4*), 223; 229; 293-297; 299; 525-534.
Reviews: R. A. Cherkasov, G. A. Kutyrev, A. N. Pudovik, Tetrahedron, 1985,**41**(*13*), 2567-2624; **41**(*22*), 5061-5087.

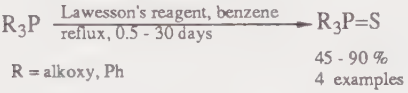
Availability Aldrich: 97%, p.

Lancaster Synthesis: p, bulk prices available.

Sigma: £.

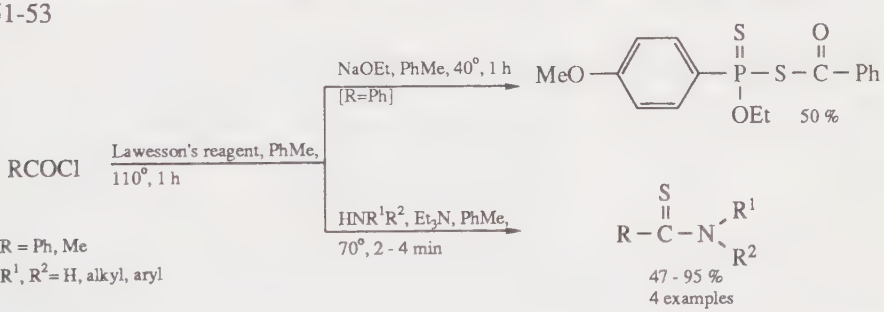
Sulphuration of trialkyl phosphites and triphenylphosphine with Lawesson's reagent

N. G. Zabirov, R. A. Cherkasov, I. S. Khalikov, A. N. Pudovik, *J. Gen. Chem. USSR, (Engl. Transl.)*, 1986, **56**(*12,1*), 2365-2368



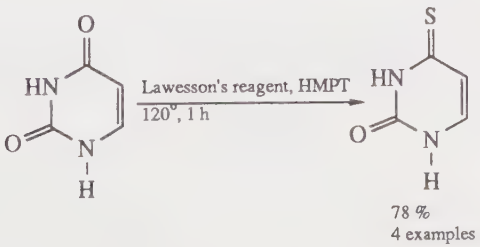
Reaction of acid chlorides with bis(methoxyphenyl)-dithiadiphosphetane disulphide: thioamidation of amines

N. M. Yousif, M. A. Salama, *Phosphorus Sulfur Relat. Elem.*, 1987, **32**(*1-2*), 51-53



Thionation of pyrimidinediones with Lawesson's reagent

K. Kaneko*, H. Katayama, T. Wakabayashi, T. Kumonaka, *Synthesis*, 1988, (*2*), 152-154

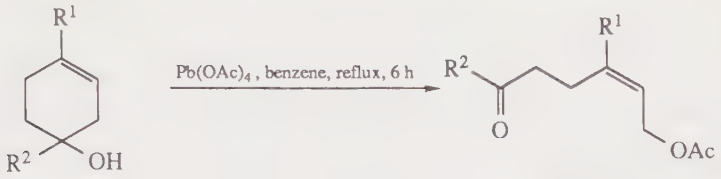


56. Lead(IV) acetate (Lead tetraacetate)

CAS Registry Number	546-67-8
CAS Name	Acetic acid, compounds, lead(4+) salt
Molecular Formula	$(AcO)_4Pb$
Molecular Weight	443.37
Boiling Point	Not available.
Melting Point	175°C
Density	2.228 kg/m^3
Refractive Index	Not available.
Safety and Handling	Highly toxic. Moisture sensitive. Irritant.
Reactions	Oxidizing agent. Acetoxylation reagent. Reviews: *Synthesis*, 1970, 279; 1971, 501; 1973, 567; *Org. React.*, 1972, **19**, 279.
Availability	Aldrich: p. Lancaster Synthesis: p, bulk prices available. Johnson Matthey: p. Sigma: approx. 95%, p.

Synthesis of *Z*-allyl acetates from cyclic homoallyl alcohols

P. Ramaiah, A. S. Rao*, *Tetrahedron Lett.*, 1988, **29**(*17*), 2119-2120

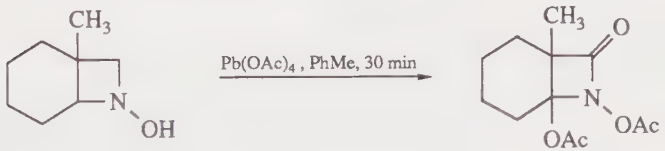


30 - 52 %
5 examples

R^1 = H, Me
R^2 = H, aryl, Me

Oxidation of 1-hydroxyazetidines to β-lactams

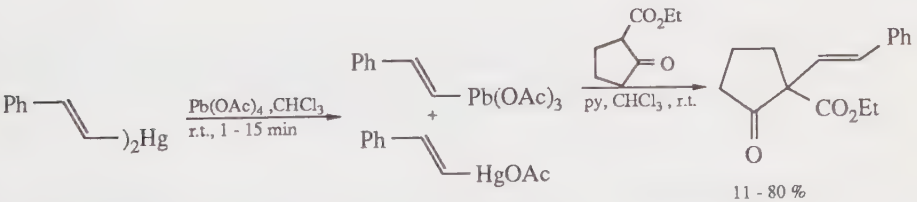
P. A. Van Elburg, D. N. Reinhoudt, *Recl. Trav. Chim. Pays-Bas*, 1988, **107**(*5*), 381-387



70 %

α-Vinylation of β-dicarbonyls using lead tetraacetate and divinyl mercury compounds

M. G. Moloney, J. T. Pinhey*, *J. Chem. Soc., Perkin Trans. 1*, 1988, (*10*), 2847-2854



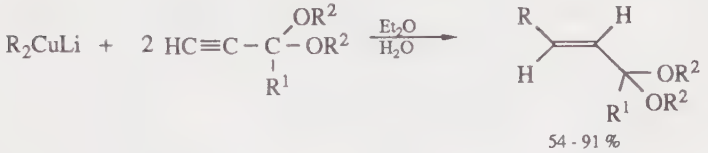
11 - 80 %
9 examples

57. Lithium dimethylcuprate

CAS Registry Number	15681-48-8
CAS Name	Cuprate(1-), dimethyl-, lithium
Molecular Formula	Me_2CuLi
Molecular Weight	100.56
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Moisture sensitive. Air sensitive.
Reactions	Reductive cleavage. Cross-coupling with alkyl halides. Addition to double bonds. Alkene synthesis from allyl acetates: R. J. Anderson, C. A. Henrick, J. B. Siddal, *J. Am. Chem. Soc.*, 1970, **92**(*3*), 735-737. Reviews: B. H. Lipschutz, R. S. Wilhelm, J. A. Kozlowski, *Tetrahedron*, 1984, **40**(*24*), 5005-5038; B. H. Lipschutz, *Synthesis*, 1987, (*4*), 325-341 (higher-order cuprates); Y. Yamamoto, *Angew. Chem. (Int. Ed. Engl.)*, 1986, **25**(*11*), 947-959.
Availability	Not commercially available.
Preparation	R_2CuLi are prepared *in situ* by mixing 2 mol RLi with 1 mol cuprous halide in ether at low temperatures, or by dissolving an alkyl copper compound in an alkyllithium solution.
Other Preparations	An improved method is given by House *et al.*, *J. Org. Chem.*, 1975, **40**, 1460. See also: *An Introduction to Synthesis using Organocopper Reagents*, G. H. Posner, Interscience, NY, 1980.

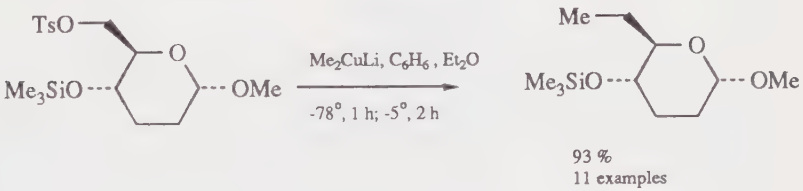
Carbocupration of acetylenic acetals and ketals

A. Alexakis*, A. Commercon, C. Coulentianos, S. F. Normant, *Tetrahedron*, 1984, **40**(*4*), 715-731



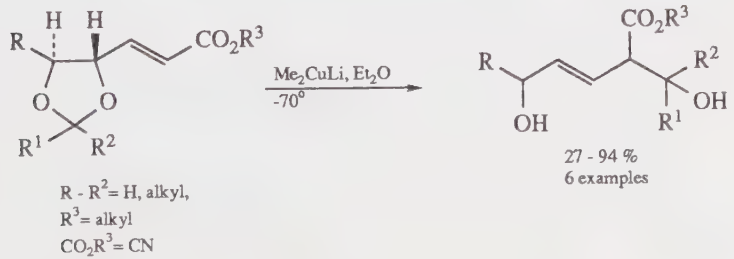
Alkylation of carbohydrate primary tosylates with organocuprate or Grignard reagents

J.-R. Pougny, *Tetrahedron Lett.*, 1984, **25**(*22*), 2363-2366

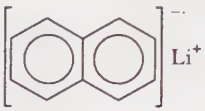


Reductive cleavage of γ,δ-alkylidenedioxy-α,β-unsaturated esters promoted by organocuprates

S. Takano*, Y. Sekiguchi, K. Ogasawara, *J. Chem. Soc., Chem. Commun.*, 1988, (*7*), 449-450

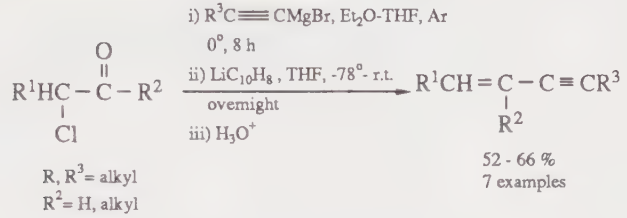


58. Lithium naphthalenide

CAS Registry Number	7308-67-0
CAS Name	Naphthalene, radical ion (1-), lithium
Molecular Formula	
Molecular Weight	134.11
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Moisture sensitive. Air sensitive.
Reactions	Catalyses reaction of amines with alkenes: *J. Chem. Technol. Biotechnol.*, 1987, **37**(2), 95-99.
Availability	Not commercially available.
Preparation	T. Azuma, S. Yanagida, H. Sakurai, S. Sasa, K. Yoshino, *Synth. Commun.*, 1982, **12**(2), 137-140.
Other Preparations	*Chem. Ind. (London)*, 1983(*4*), 167-168; *Nippon Kagaku Kaishi*, 1984(*11*), 1744-1746.

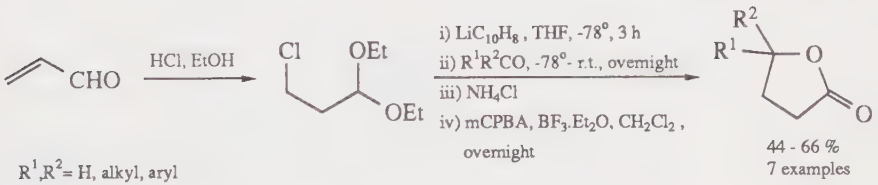
One-pot synthesis of conjugated enynes

J. Barluenga*, M. Yus, J. M. Concellon, P. Bernad, F. Alvarez, *J. Chem. Res. Synop.*, 1985, (*4*), 128-129



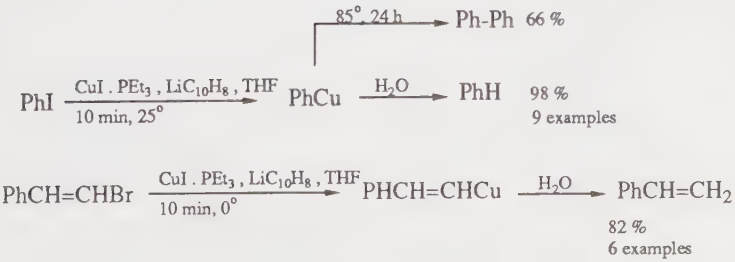
Butyrolactones from carbonyl compounds and chloropropanal diethyl acetal

J. Barluenga*, J. R. Fernandez, M. Yus, *J. Chem. Soc., Chem. Commun.*, 1987, (*20*), 1534-1535



Rapid oxidative addition of copper to alkyl, aryl, alkynyl and vinyl halides

G. W. Ebert, R. D. Rieke*, J. Org. Chem., *1988*, **53**(*19*), 4482-4488

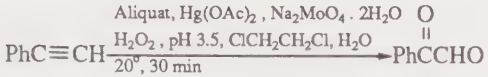


59. Mercury(II) acetate (Mercuric acetate)

CAS Registry Number	1600-27-7
CAS Name	Acetic acid, compounds, mercury(2+) salt.
Molecular Formula	$(AcO)_2Hg$
Molecular Weight	318.68
Boiling Point	Not available.
Melting Point	179-182°C
Density	3.270 kg/m^3
Refractive Index	Not available.
Safety and Handling	Highly toxic. Light sensitive.
Reactions	Mercuration reagent. Acetoxylation. Reviews: *Angew. Chem.*, 1978, **90**, 28; *Angew. Chem. (Int. Ed. Engl.)*, 1978, **17**, 27; *Tetrahedron*, 1982, **38**, 1713; *Synthesis*, 1973, 567.
Availability	Aldrich: 98+%, ACS reagent, p. Lancaster Synthesis: 98+%, p, bulk prices available. Johnson Matthey: crystalline, p.

Phase-transfer catalytic oxidation of terminal alkynes to keto aldehydes

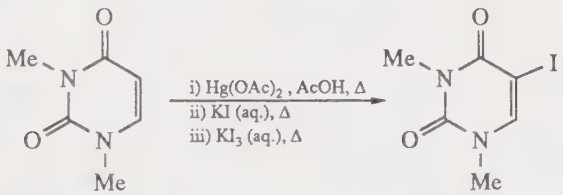
F. P. Ballistreri, S. Failla, G. A. Tomaselli*, *J. Org. Chem.*, 1988, **53**(*4*), 830-831



43 %
2 examples

Alkylhalouracils via direct mercuration of alkyluracils

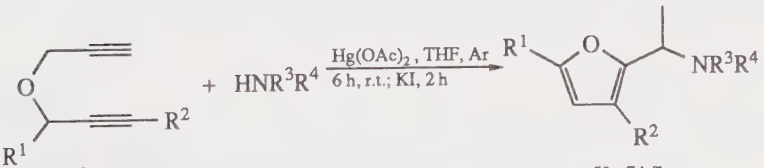
L. Skulski*, A. Kujiwa, T. M. Kujawa, *Bull. Pol. Acad. Sci., Chem.*, 1987, **35**(*11-12*), 499-505



88 %
4 examples

Mercury(II) catalyzed one-pot regioselective synthesis of aminoethylfurans

J. Barluenga*, F. Aznar, M. Boyod, *Tetrahedron Lett.*, 1988, **29**(*39*), 5029-5032



R^1, R^2 = H, Me, Et, Ph
R^3, R^4 = morpholino, cycloalkyl

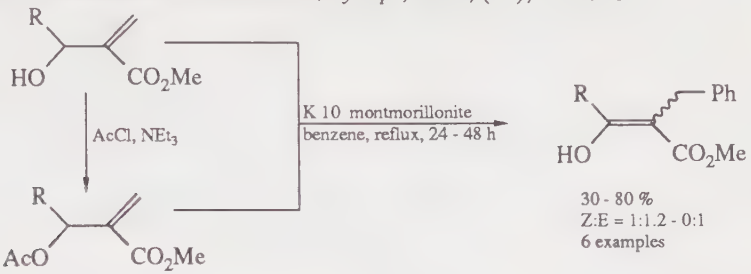
58 - 74 %
6 examples

60. Montmorillonite clay

CAS Registry Number	1318-93-0
CAS Name	Montmorillonite $((Al_{1.33\text{-}1.67}Mg_{0.33\text{-}0.67})(Ca_{0\text{-}1}Na_{0\text{-}1})_{0.33}Si_4(OH)_2O_{10}.xH_2O)$
Molecular Formula	$(Al_{1.33\text{-}1.67}Mg_{0.33\text{-}0.67})(Ca_{0\text{-}1}Na_{0\text{-}1})_{0.33}Si_4(OH)_2O_{10}.xH_2O$
Molecular Weight	Not available.
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Michael reactions. Cycloadditions. Oxidations.
Availability	Aldrich: Montmorillonite K10, p; Montmorillonite KSF, p.

Allylic phenylation of hydroxy methylene esters with benzene and montmorillonite K10

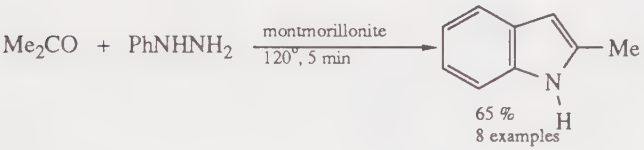
D. Saib, A. Foucaud*, *J. Chem. Res., Synop.*, 1987, (*11*), 372-373



R = alkyl, aryl

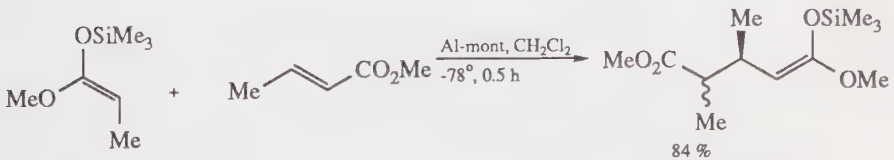
Synthesis of indoles from ketones and phenylhydrazines using montmorillonite clay as catalyst

P. Bhattacharyya*, S. S. Jash, *Indian J. Chem., Sect. B*, 1987, **26**(*12*), 1177



Montmorillonite clay as an efficient heterogeneous catalyst for Michael reactions of silyl ketene acetals and silyl enol ethers with α,β-unsaturated carbonyl compounds

M. Kawai, M. Onaka*, Y. Izumi*, *Bull. Chem. Soc. Jpn.*, 1988, **61**(*6*), 2157-2164



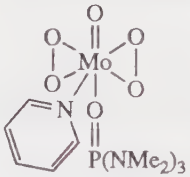
Al-mont = aluminium ion exchanged montmorillonite

61. MoOPH (Oxodiperoxymolybdenum-pyridine-hexamethylphosphoramide)

CAS Registry Number 23319-63-3

CAS Name Molybdenum, (hexamethylphosphoric triamide-*O*)-oxodiperoxy(pyridine)-

Molecular Formula



Molecular Weight 434.24

Boiling Point Not available.

Melting Point 116°C (dec.)

Density Not available.

Refractive Index Not available.

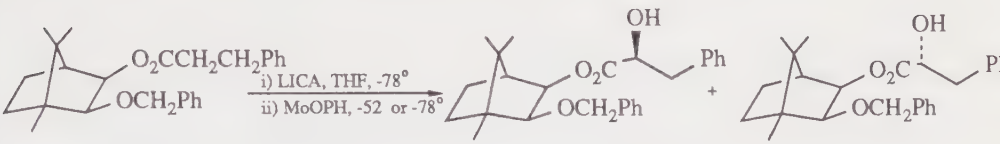
Safety and Handling Highly toxic. Cancer suspect agent.

Reactions Oxidation. Hydroxylation of enolates. Stereoselective oxidant for organoboranes: *J. Org. Chem.*, 1980, **45**, 4514.

Availability Aldrich: £££.

Asymmetric synthesis of α-hydroxy esters

R. Gamboni, P. Mohr, N. Waespe-Sarcevic, C. Tamm*, *Tetrahedron Lett.*, 1985, **26**(2), 203-206

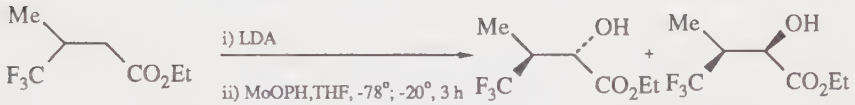


LICA = lithium isopropylcyclohexylamide

80 %
2:8 mixture
4 examples

Trifluoromethyl group induced stereoselective synthesis of α-hydroxy carbonyl compounds

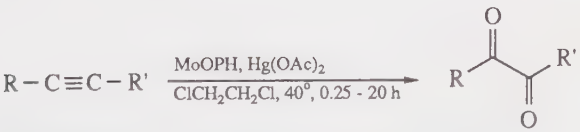
Y. Morizawa*, A. Yasuda, K. Uchida, *Tetrahedron Lett.*, 1986, **27**(*16*), 1833-1836



75 %
93:3 mixture
6 examples

Synthesis of α-dicarbonyl compounds by oxidation of alkynes

F. P. Ballistreri, S. Failla, G. A. Tomeselli*, R. Curci, *Tetrahedron Lett.*, 1986, **27**(*42*), 5139-5142



R, R'= H, alkyl, aryl

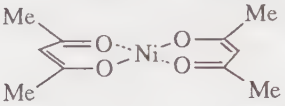
55 - 90%
8 examples

62. Nickel(II) acetylacetonate (Pentane-2,4-dione, nickel(II) derivative)

CAS Registry Number 3264-82-2

CAS Name Nickel, bis(3-oxobutanoato-O^1,O^3)-

Molecular Formula



Molecular Weight 256.91, 274.94 (hydrate)

Boiling Point Not available.

Melting Point 230°C (dec.), 285° (dec.) (hydrate)

Density Not available.

Refractive Index Not available.

Safety and Handling Cancer suspect agent. Hygroscopic.

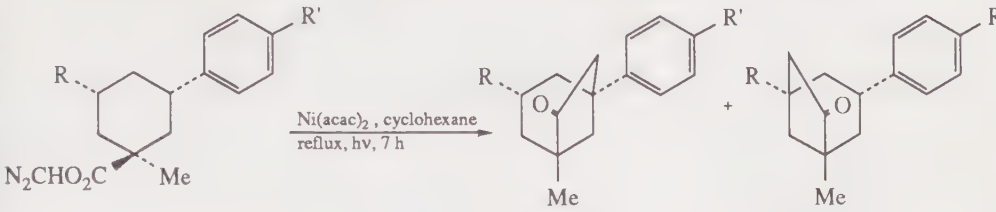
Reactions Homogeneous catalyst. Coupling catalyst.
Review: *Adv. Organomet. Chem.*, 1979, **17**, 195.

Availability Aldrich: anhydrous, 95%, £; anhydrous, tech. grade, 90%, p; hydrate, p.

Lancaster Synthesis: hydrate, p, bulk prices available.

Carbenoid insertion catalyst

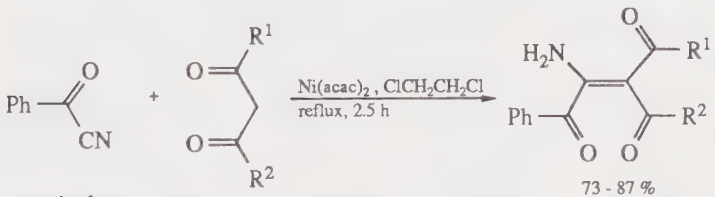
A. K. Chakraborti, J. K. Ray, K. K. Kundu, S. Chakrabarty, D. Mukherjee, U. R. Ghatak*, *J. Chem. Soc., Perkin Trans. 1*, 1984, (*2*), 261-273



71 - 75 %
45:55 - 90:10 mixtures of isomers
3 examples

Regioselective metal-catalyzed addition of β-dicarbonyl compounds to benzoyl cyanide

M. Basato*, B. Corain*, M. Cofler, A. C. Veronese, G. Zanotti, *J. Chem. Soc., Chem. Commun.*, 1984, (*23*), 1593-1594

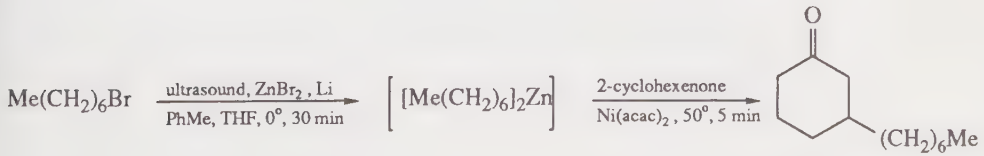


R^1, R^2= Me, Ph

73 - 87 %
3 examples

Ultrasound preparation of organozinc reagents and their nickel-catalyzed reactions with α,β-unsaturated carbonyl compounds

C. Petrier, J. C. de Souza Barbosa, C. Dupuy, J.-L. Luche*, *J. Org. Chem.*, 1985, **50**(*26*), 5761-5765



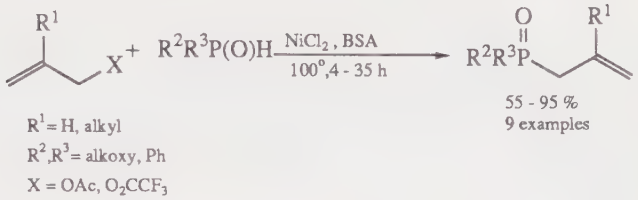
88 %
17 examples

63. Nickel(II) chloride

CAS Registry Number	7718-54-9, 7791-20-0 (hexahydrate)
CAS Name	Nickel chloride ($NiCl_2$)
Molecular Formula	$NiCl_2$
Molecular Weight	129.62, 237.71 (hexahydrate)
Boiling Point	973°C (subl.)
Melting Point	1001°C
Density	3.55 kg/m^3
Refractive Index	1.57 (hexahydrate)
Safety and Handling	Cancer suspect agent. Toxic. Deliquescent.
Reactions	Condensation. Reduction.
Availability	Aldrich: hexahydrate, 99.9999%, ff; hexahydrate, 99%, p. Johnson Matthey: hexahydrate, crystalline, Spec-pure®, p; hexahydrate AR, 98%, p; hexahydrate, 99%, p. Sigma: hexahydrate, crystalline, p.

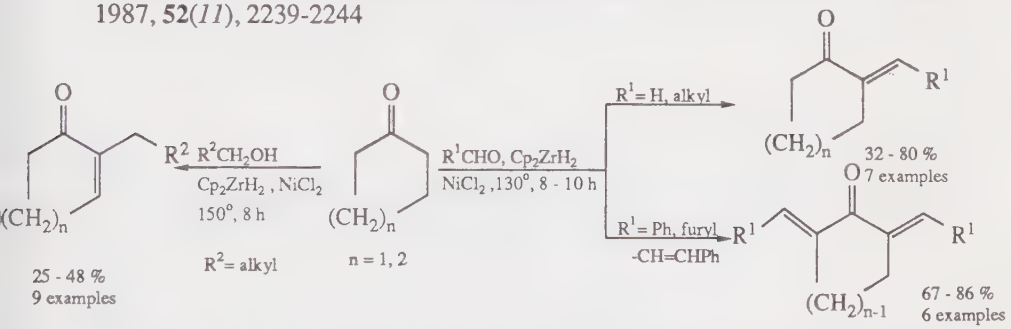
Nickel chloride-catalyzed reaction of allyl acetates with dialkyl phosphonates

Lu Xi-Yan*, Z. Jing-Yang, *Huaxue Xuebao*, 1987, **45**(*3*), 312-313



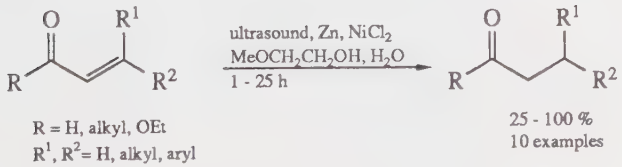
Cross-condensation of cycloalkanones with aldehydes and primary alcohols

T. Nakano, S. Irifune, S. Umano, A. Inada, Y. Ishii*, M. Ogawa, *J. Org. Chem.*, 1987, **52**(*11*), 2239-2244



Ultrasonically improved reduction of α,β-unsaturated carbonyl compounds with an aqueous zinc-nickel(II) chloride system

C. Petrier, J.-L. Luche, *Tetrahedron Lett.*, 1987, **28**(*21*), 2347-2350

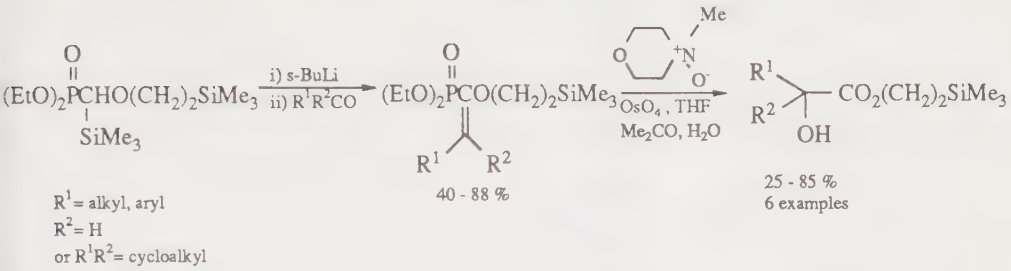


64. Osmium(VIII) oxide (Osmic acid, osmium tetroxide)

CAS Registry Number	20816-12-0
CAS Name	Osmium oxide (OsO_4)
Molecular Formula	OsO_4
Molecular Weight	254.20
Boiling Point	130°C
Melting Point	39.5-41°C
Density	4.900 kg/m^3
Refractive Index	Not available.
Safety and Handling	Highly toxic by inhalation, in contact with skin and if swallowed. Corrosive. Oxidizer. Pyrophoric.
Reactions	Oxidation. Reagent for *cis*-dihydroxylation of double bonds. Reviews: *Synthesis*, 1974, 229; *Chem. Rev.*, 1980, **80**, 187.
Availability	Aldrich: 99.8% (ampoules), £££; 4 wt% in H_2O (ampoules), ££; 2.5 wt% in Bu^tOH (stabilized with Bu^tOOH), ££. Lancaster Synthesis: 99.8+%, £££ (reagents and literature references are given for regeneration of OsO_4). Johnson Matthey: 2-4% aq. soln (ampoules), p; 0.1-1.0 g units (ampoules), £££. Sigma: (ampoules), £££.

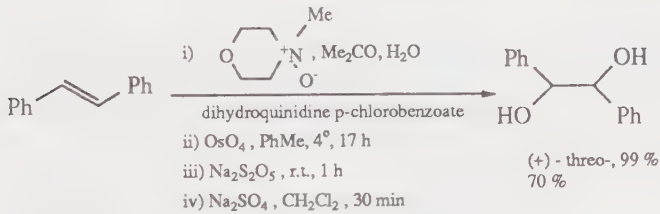
Homologation of carbonyl compounds to α-hydroxy carboxylic esters by diethyl (trimethylsilylethoxymethyl)phosphonate

J. Binder, E. Zbiral*, *Tetrahedron Lett.*, 1986, **27**(*48*), 5829-5832



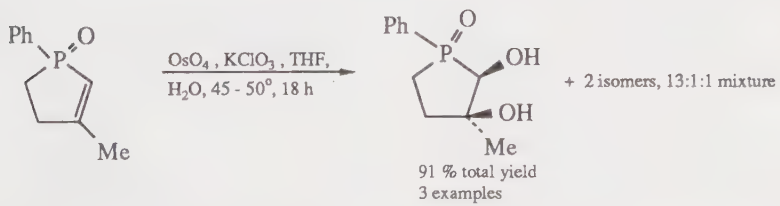
Asymmetric dihydroxylation of alkenes via ligand-accelerated catalysis

E. N. Jacobsen, I. Marko, W. S. Mungall, G. Schroder, K. B. Sharpless*, *J. Am. Chem. Soc.*, 1988, **110**(*6*), 1968-1970



Stereocontrolled preparation of phospho-sugars from phospholenes

M. Yamashita*, M. Uchimura, A. Iida, L. Parkanayr, J. Clardy, *J. Chem. Soc., Chem. Commun.*, 1988, (*9*), 569-570

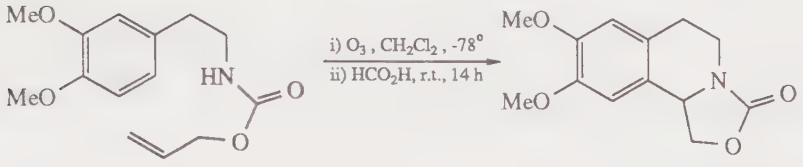


65. Ozone

CAS Registry Number	10028-15-6
CAS Name	Ozone
Molecular Formula	O_3
Molecular Weight	47.9982
Boiling Point	-111°C
Melting Point	-192.7°C
Density	2.144 (0°, gas)
Refractive Index	1.2226 (liq.)
Safety and Handling	Toxic by inhalation. Irritating to respiratory system. Highly explosive. Forms explosive peroxides with alkanes, arenes, reacts explosively with N_2O_4, HBr, C_2H_4, N_2, NO.
Reactions	Oxidation. Ether cleavage. Hydroxylation. Review: *Chem. Rev.*, 1958, **58**, 925-1010.
Availability	Not commercially available.
Preparation	Prepared from oxygen using commercially available ozonizer.

Synthesis of heterocyclic fused isoquinolines through *N*-acyliminium ion intermediates

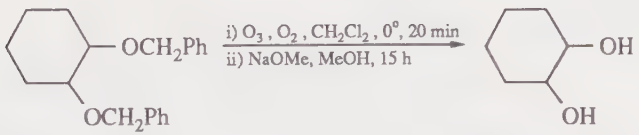
S. Kano*, Y. Yuasa, S. Shibuya, *Synth. Commun.*, 1985, **15**(*10*), 883-889



75 %
12 examples

Mild deprotection of benzyl ether protective groups with ozone

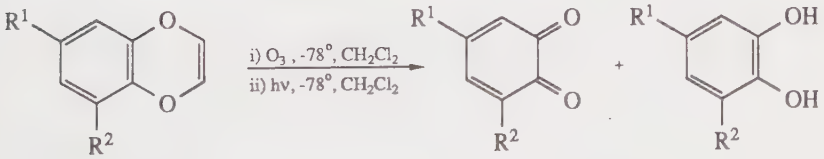
P. Angibeaud, J. Defaye*, A. Gadelle, J.-P. Utille, *Synthesis*, 1985, (*12*), 1123-1125



81 %
6 examples

Synthesis of 1,2-benzoquinones from 1,4-benzodioxins

C. Kashima*, A. Tomotake, Y. Omote, *Heterocycles*, 1987, **26**(2), 363-366



R^1 = H, Cl, alkyl
R^2 = H, alkyl

17 - 41 %

46 - 51 %

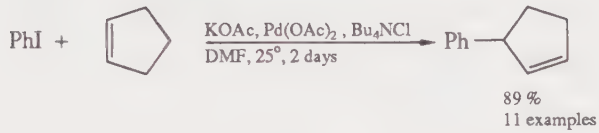
4 examples

66. Palladium(II) acetate

CAS Registry Number	3375-31-3
CAS Name	Acetic acid, compounds, palladium(2+) salt
Molecular Formula	$(AcO)_2Pd$
Molecular Weight	224.49
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Harmful.
Reactions	Homogeneous catalyst: *Tetrahedron*, 1981, **37**, 1213. Heck reaction catalyst. Reviews: *Org. React.*, 1982, **27**, 345; *Pure Appl. Chem.*, 1978, **50**, 691; *Acc. Chem. Res.*, 1979, **12**, 146; *Synthesis*, 1970, 225; 1973, 524; 1985, 253; *Tetrahedron*, 1977, **33**, 2615.
Availability	Aldrich: 98%, £££. Lancaster Synthesis: £££. Sigma: £££.

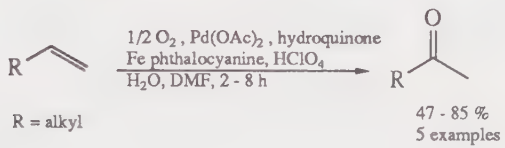
Palladium-catalyzed intermolecular allylic arylation under exceptionally mild conditions

R. C. Larock*, B. E. Baker, *Tetrahedron Lett.*, 1988, **29**(*8*), 905-908



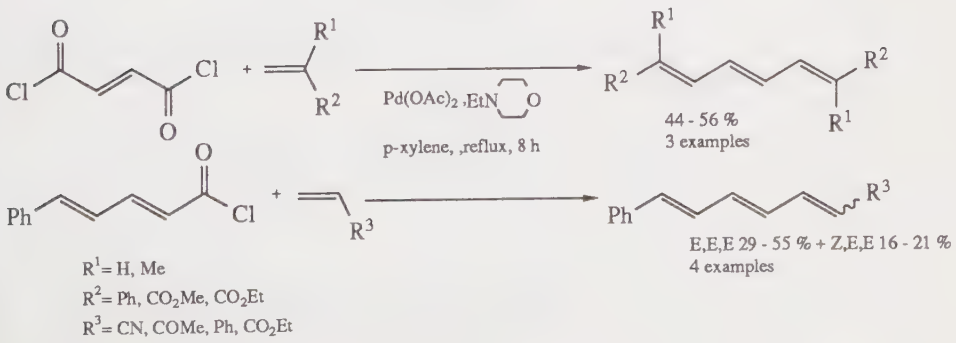
Multi-step catalysis for the oxidation of alkenes to ketones by molecular oxygen

J.-E. Backvall*, R. B. Hopkins, *Tetrahedron Lett.*, 1988, **29**(*23*), 2885-2888



Palladium-catalyzed synthesis of conjugated trienes

A. Kasahara*, T. Izumi, N. Kudou, *Synthesis*, 1988, (*9*), 704-705

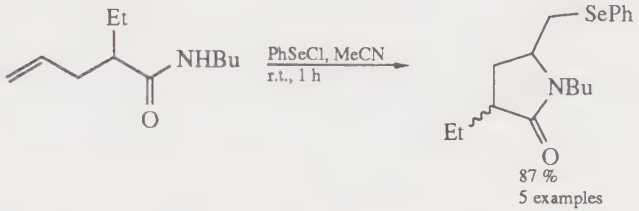


67. Phenylselenenyl chloride

CAS Registry Number	5707-04-0
CAS Name	Benzeneselenenyl chloride
Molecular Formula	PhSeCl
Molecular Weight	191.52
Boiling Point	120°C/20 mmHg
Melting Point	63-65°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Highly toxic. Corrosive. Air sensitive.
Reactions	Cyclization. Phenylselenylation. Reviews: *Tetrahedron*, 1978, **34**, 1049; 1985, **41**(*21*), 427-489; *Acc. Chem. Res.*, 1979, **12**, 22; 1984, **17**, 28; S. V. Ley, *Chem. Ind. (London)*, 1985, (*4*), 101-106.
Availability	Aldrich: 98%, ££. Lancaster Synthesis: 98%, ££, bulk prices available.

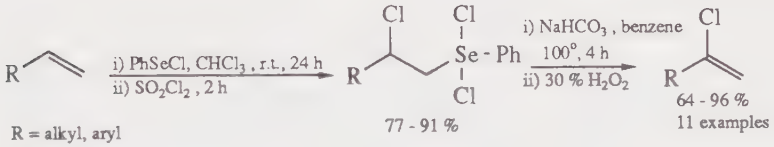
Intramolecular amidoselenation of unsaturated amides leading to lactams

A. Toshimitsu*, K. Terao, S. Uemura, *Tetrahedron Lett.*, 1984, **25**(*51*), 5917-5920



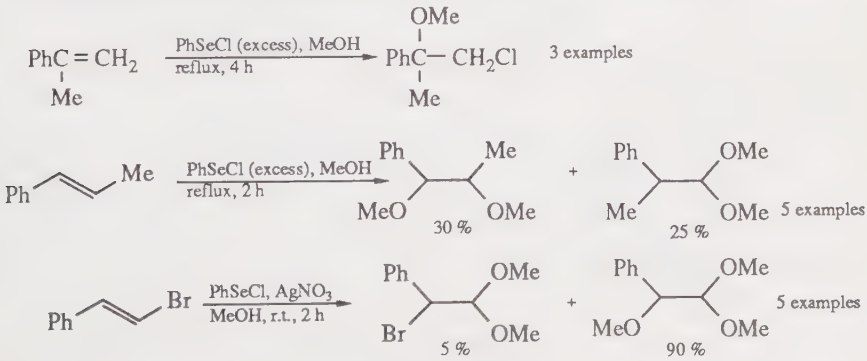
Preparation of chloroalkenes via selenoxide elimination

L. Engman, *Tetrahedron Lett.*, 1987, **28**(*13*), 1463-1466



Reactions of styrenes and vinyl halides with phenylselenium chloride. Synthesis of chlorophenylethyl ethers, dimethoxyphenylalkanes and α-alkoxy acetals

M. Tiecco*, L. Testaferri*, M. Tingoli, D. Chianelli, D. Bartoli, *Tetrahedron*, 1988, **44**(*8*), 2261-2272, 2273-2282

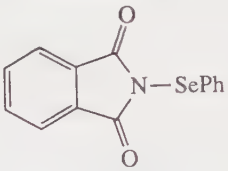


68. *N*-(Phenylseleno)phthalimide

CAS Registry Number 71098-88-9

CAS Name 1*H*-Isoindole-1,3(2*H*)-dione, 2-(phenylseleno)-

Molecular Formula



Molecular Weight 302.19

Boiling Point Not available.

Melting Point 181-184°C

Density Not available.

Refractive Index Not available.

Safety and Handling Highly toxic. Moisture sensitive. Air sensitive.

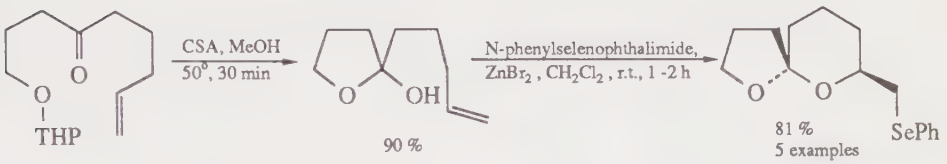
Reactions Phenylselenylation.
Reviews: *Tetrahedron*, 1978, **34**, 1049; 1985, **41**(*21*) 427-489; *Acc. Chem. Res.*, 1979, **12**, 22; 1984, **17**, 28; S. V. Ley, *Chem. Ind. (London)*, 1985, (*4*), 101-106.

Availability Aldrich: £££.

Lancaster Synthesis: £££, bulk prices available.

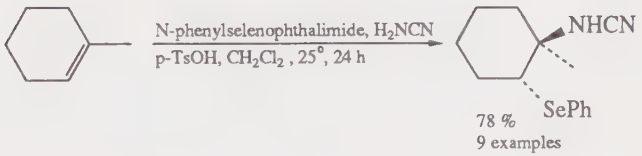
Synthesis of spiroacetals from alkenyl hydroxy ketones

A. M. Doherty, S. V. Ley*, B. Lygo, D. J. Williams, *J. Chem. Soc., Perkin Trans. 1*, 1984, (*6*), 1371-1377



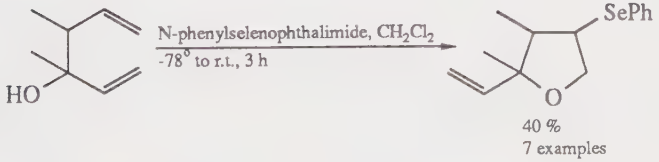
Cyanamidoselenenylation of alkenes

R. Hernandez, G. I. Leon, J. A. Salazar*, E. Suarez, *J. Chem. Soc., Chem. Commun.*, 1987, (*4*), 312-314



Cyclization of hexadienols to tetrahydrofurans with *N*-phenylselenophthalimide

E. Magnol, J. Gore, M. Malacria*, *Bull. Soc. Chim. Fr.*, 1987, (*3*), 455-461

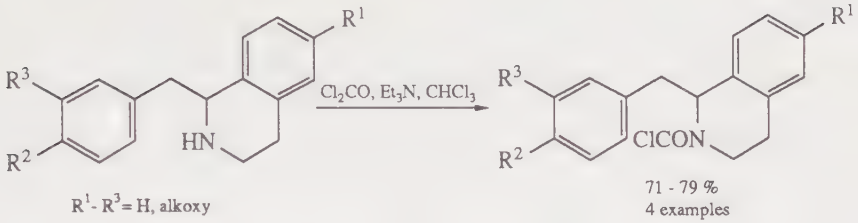


69. Phosgene
(Carbonyl chloride, carbon oxychloride)

CAS Registry Number	75-44-5
CAS Name	Carbonic dichloride
Molecular Formula	Cl_2CO
Molecular Weight	98.92
Boiling Point	7.6°C
Melting Point	-104°C
Density	1.392 kg/m^3
Refractive Index	Not available.
Safety and Handling	Very toxic by inhalation.
Reactions	Chloroformylation. Carbonylation.
Availability	Not commercially available.
Preparation	E. E. Hardy, in *Kirk-Othmer Encycl. Chem. Technol.*, 2nd edn, Vol. Suppl., ed. A. Standen, Interscience, NY, pp. 674-683.

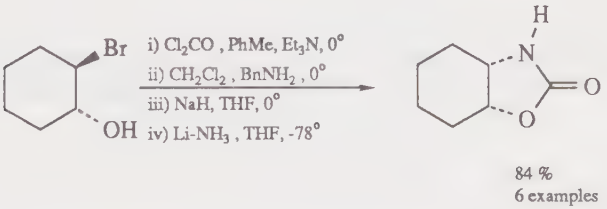
Chloroformylation of benzyltetrahydroisoquinolines

J. F. Stambach*, L. Jung, *Tetrahedron*, 1985, **41**(*1*), 169-172



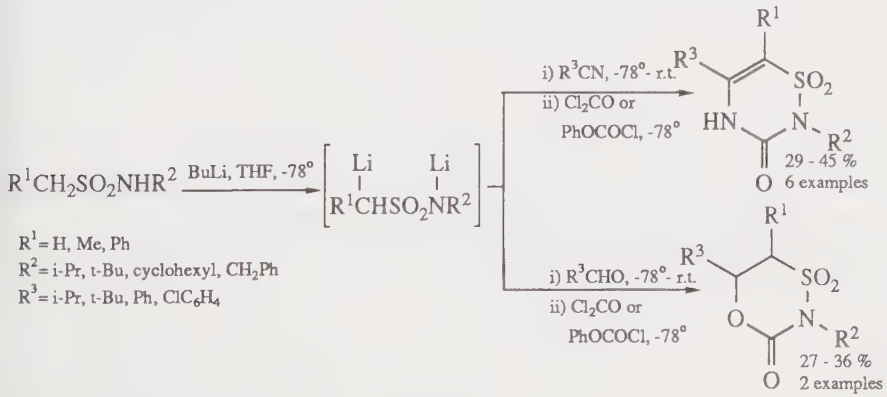
Stereo- and regiospecific oxyamination of alkenes via the corresponding bromohydrins

J. Das, *Synth. Commun.*, 1988, **18**(*9*), 907-915



Improved, one-pot synthesis of thiadiazinone dioxides

M. E. Thompson, *Synthesis*, 1988, (*9*), 733-735

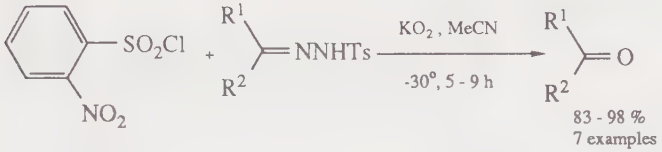


70. Potassium superoxide

CAS Registry Number	12030-88-5
CAS Name	Potassium dioxide
Molecular Formula	KO_2
Molecular Weight	71.10
Boiling Point	Not available.
Melting Point	380°C
Density	2.14 kg/m^3
Refractive Index	Not available.
Safety and Handling	Stable when pure. Oxidizer. Reacts violently with Se_2Cl_2, explosively with hydrocarbons. Oxidises As, Sb, Cu, Sn, Zn with incandescence.
Reactions	Oxidation.
Availability	Aldrich: powder, p; chunks (5-10mm particle size), p. Sigma: p.

Facile conversion of tosylhydrazones to carbonyl compounds

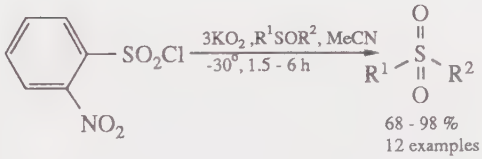
Y. H. Kim*, H. K. Lee, H. S. Chang, *Tetrahedron Lett.*, 1987, **28**(*37*), 4285-4288



R^1= alkyl, aryl
R^2= H, Me

Oxidation of sulphoxides to sulphones with a peroxysulphur generated *in situ* from nitrobenzenesulphonyl chloride and superoxide

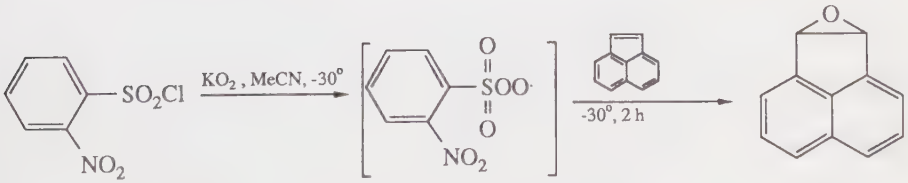
Y. H. Kim*, H. K. Lee, *Chem. Lett.*, 1987, (*8*), 1499-1502



R^1, R^2= alkyl, aryl

Oxidation of arenes to arene oxides by a nitrobenzene peroxysulphur intermediate from nitrobenzenesulphonyl chloride and superoxide

H. H. Lee, K. S. Kim, J. C. Kim, Y. H. Kim*, *Chem. Lett.*, 1988, (*4*), 561-564

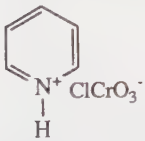


71. Pyridinium chlorochromate (PCC)

CAS Registry Number 26299-14-9

CAS Name Chromate (1-), chlorotrioxo, (T-4)-, hydrogen, compound with pyridine (1:1)

Molecular Formula



Molecular Weight 215.56

Boiling Point Not available.

Melting Point 205°C (dec.)

Density Not available.

Refractive Index Not available.

Safety and Handling Cancer suspect agent. Oxidizer.

Reactions Stable versatile oxidizing agent.
Review: *Synthesis* 1982, 245.

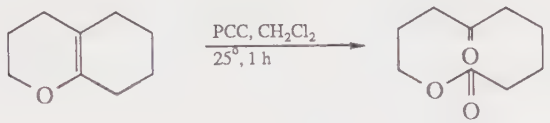
Availability Aldrich: 98%, p.

Lancaster Synthesis: 98%, p, bulk prices available.

Sigma: p.

Facile and selective oxidative cleavage of enol ethers by pyridinium chlorochromate

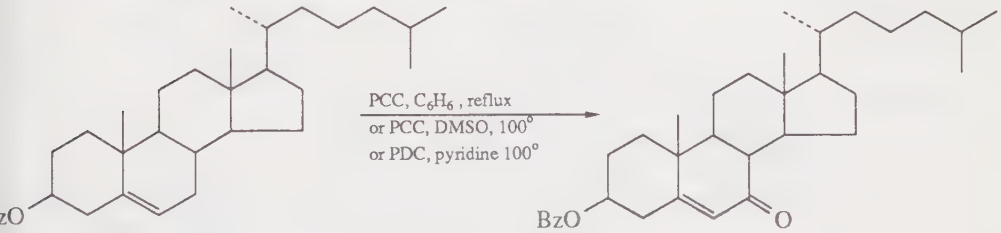
S. Baskaran, I. Islam, M. Raghavan, S. Chandrasekaran*, *Chem. Lett.*, 1987, (*6*), 1175-1178



85 %
11 examples

Allyl oxidation of Δ^5-steroids with pyridinium chlorochromate

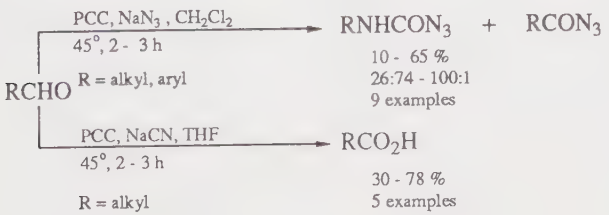
E. J. Parish*, T.-Y. Wei, *Synth. Commun.*, 1987, **17**(*10*), 1227-1233



64 - 89 %
5 examples

Pyridinium chlorochromate oxidation of aldehydes to carbamoyl/acyl azides or carboxylic acids

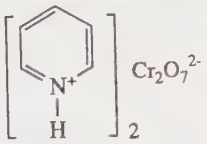
P. S. Reddy, P. Yadagiri, S. Lumin, D.-S. Shin, J. R. Falck*, *Synth. Commun.*, 1988, **18**(*5*), 545-551



72. Pyridinium dichromate (PDC)

CAS Registry Number 20039-37-6

CAS Name Chromic acid, compound with pyridine (1:2)

Molecular Formula 

Molecular Weight 376.21

Boiling Point Not available.

Melting Point 152-153°C

Density Not available.

Refractive Index Not available.

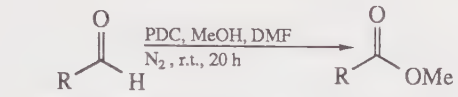
Safety and Handling Cancer suspect agent. Oxidizer.

Reactions Oxidizing agent complementary to PCC for ROH with acid-sensitive groups: *Tetrahedron Lett.*, 1979, **20**, 399; 1980, **21**, 731.

Availability Aldrich: 98%, p.

Conversion of aldehydes to methyl esters using pyridinium dichromate

B. O'Connor, G. Just*, *Tetrahedron Lett.*, 1987, **28**(*28*), 3235-3236

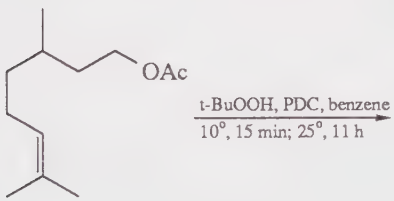


R = alkyl, cycloalkyl, steroid

60 - 87 %
4 examples

Allylic and benzylic oxidations with *tert*-butyl hydroperoxide-pyridinium dichromate

N. Chidambaram, S. Chandrasekaran*, *J. Org. Chem.*, 1987, **52**(*22*), 5048-5057



40 % yield
69 % conversion
12 examples

Synthesis of ω-alkynyl aldehydes and ketones via oxidation of ω-alkynyl alcohols with pyridinium dichromate

D. E. Bierer, G. W. Kabalka*, *Org. Prep Proced. Int.*, 1988, **20**(*1-2*), 63-72

R = H, $SiMe_3$
R'= H, Me
n = 1 - 7

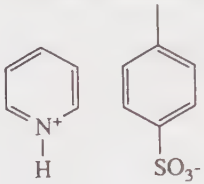
21 - 84 %
8 examples

73. Pyridinium *p*-toluenesulphonate (PPTS)

CAS Registry Number 24057-28-1

CAS Name Pyridine, 4-methylbenzenesulfonate

Molecular Formula



Molecular Weight 251.31

Boiling Point Not available.

Melting Point 117-119°C

Density Not available.

Refractive Index Not available.

Safety and Handling Moisture sensitive. Irritant.

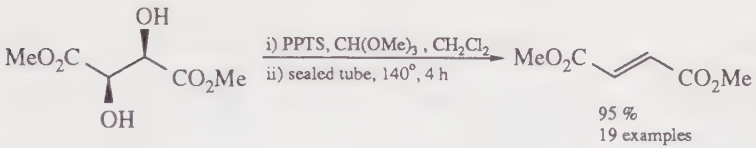
Reactions Efficient catalyst for THP ether preparation (OH protection): *J. Org. Chem.*, 1977, **42**, 3772. Cleavage of MEM and MOM ethers: *Synth. Commun.*, 1983, 1021.

Availability Aldrich: 98%, £.

Lancaster Synthesis: 98%, £, bulk prices available.

A mild and stereospecific conversion of vicinal diols into alkenes

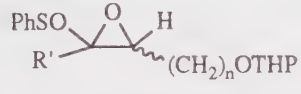
M. Ando*, H. Ohhara, K. Takase, *Chem. Lett.*, 1986, (*6*), 879-882



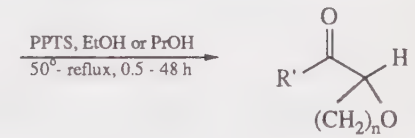
95 %
19 examples

Synthesis of acyl and keto cyclic ethers

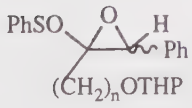
T. Satoh, K. Iwamoto, K. Yamakawa*, *Tetrahedron Lett.*, 1987, **28**(*23*), 2603-2606



R' = alkyl
n = 1 - 11



52- 90 %
7 examples

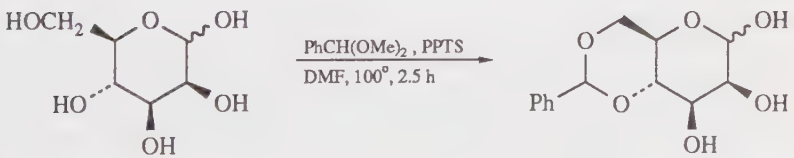


n = 3, 4

11 - 60 %
2 examples

Selective monobenzylidenation of monosaccharides with α,α-dimethoxytoluene

J. J. Patroni, R. V. Stick*, B. W. Skelton, A. H. White, *Aust. J. Chem.*, 1988, **41**(*1*), 91-102



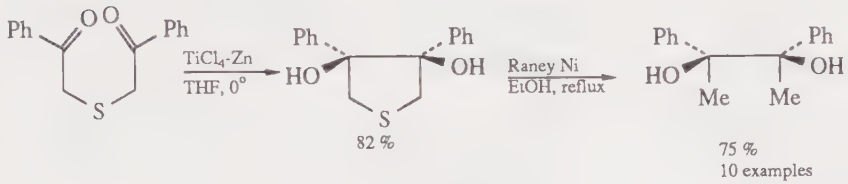
19 %
9 examples

74. Raney® nickel

CAS Registry Number	7440-02-0
CAS Name	See Nickel, uses and miscellaneous, catalysts
Molecular Formula	Not available.
Molecular Weight	Not available.
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Cancer suspect agent. Flammable solid.
Reactions	Hydrogenation catalyst.
Availability	Aldrich: active catalyst (50% slurry in H_2O, pH10), p. Sigma: active catalyst (50% slurry in H_2O, pH9), p.

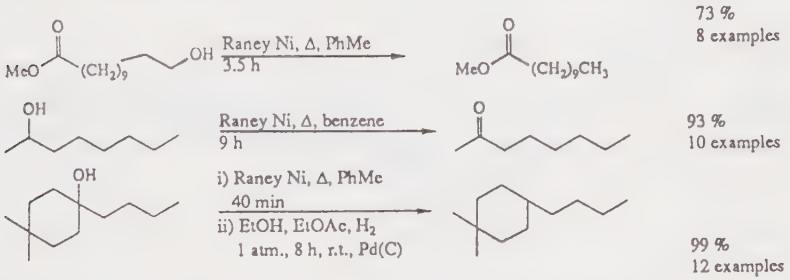
Stereoselective synthesis of *erythro*- and *threo*-1,2-diols from diketo sulphides via *cis*-3,4-dihydroxy thiolanes

J. Nakayama*, S. Yamaoka, M. Hoshino, *Tetrahedron Lett.*, 1987, **28**(*16*), 1799-1802



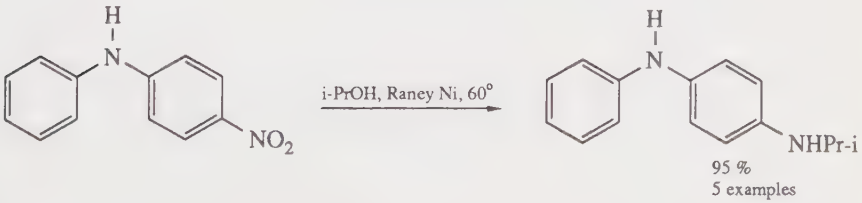
Reaction of Raney nickel with primary, secondary and tertiary alcohols

M. E. Krafft*, W. J. Crooks III, B. Zorc, S. E. Milczanowski, *J. Org. Chem.*, 1988, **53**(*14*), 3158-3163



Condensation of nitro compounds with alcohols catalyzed by Raney nickel

A. A. Banerjee, D. Mukesh*, *J. Chem. Soc., Chem. Commun.*, 1988, (*18*), 1275-1276

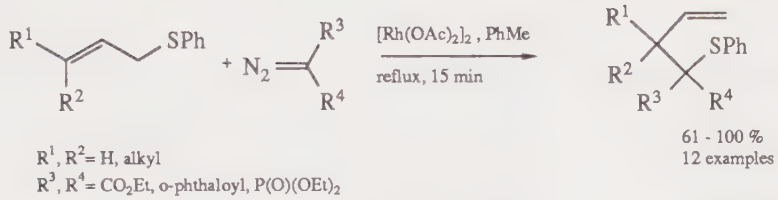


75. Rhodium(II) acetate

CAS Registry Number	5503-41-3
CAS Name	Acetic acid, compounds, rhodium(2+) salt
Molecular Formula	$[(AcO)_2Rh]_2$
Molecular Weight	441.99
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Catalyst for formation of carbenes from diazo compounds. Homogeneous catalyst: *Tetrahedron Lett.*, 1980, **21**, 4039.
Availability	Aldrich: dimer, £££.

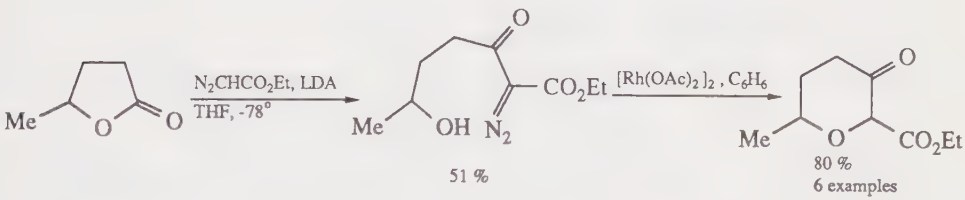
Synthesis of γ,δ-unsaturated carbonyl compounds from allyl sulphides and α-diazo carbonyl compounds

S. Takano*, S. Tomita, M. Takahashi, K. Ogasawara, *Chem. Lett.*, 1987, (*8*), 1569-1570



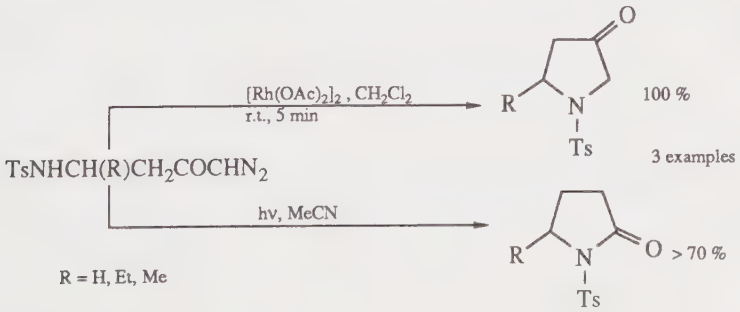
Preparation and rhodium(II) acetate catalyzed cyclization of ω-hydroxy-, -mercapto-, and -amino-α-diazo-β-keto esters

C. J. Moody*, R. J. Taylor, *Tetrahedron Lett.*, 1987, **28**(*44*), 5351-5352



Synthesis of tosylpyrrolidinones via ketenes and carbenes

A. Saba*, A. Selva, *Heterocycles*, 1987, **27**(*4*), 867-870

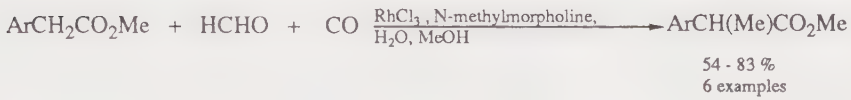


76. Rhodium(III) chloride

CAS Registry Number	10049-07-7, 20765-98-4 (hydrate)
CAS Name	Rhodium chloride ($RhCl_3$)
Molecular Formula	$RhCl_3$
Molecular Weight	209.26, 263.31 (trihydrate)
Boiling Point	800°C (subl.)
Melting Point	450-500°C (dec.)
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Highly toxic. Hygroscopic.
Reactions	Condensation catalyst. Hydrogenation catalyst.
Availability	Aldrich: anhydrous, £££; hydrate, £££. Lancaster Synthesis: hydrate, £££, bulk prices available. Johnson Matthey: hydrate, crystalline, £££.

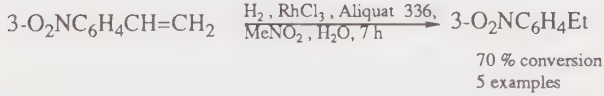
Synthesis of methyl 2-arylpropionates from methyl arylacetates and formaldehyde

K. Takeuchi, Y. Sugi, T. Matsuzaki, H. Arakawa, K. Bando, *Chem. Ind.* (*London*), 1985, (*13*), 446-447



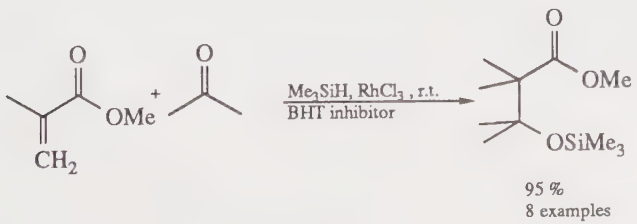
Selective C-C bond hydrogenation of unsaturated nitro compounds in the presence of a rhodium(III) chloride-Aliquat 336 system

I. Amer, T. Bravdo, J. Blum*, K. P. C. Vollhardt, *Tetrahedron Lett.*, 1987, **28**(*12*), 1321-1322



Synthesis of β-siloxy esters by condensation of carbonyl compounds and trimethylsilane with α,β-unsaturated esters catalyzed by rhodium(III) chloride

A. Revis*, T. K. Hilty, *Tetrahedron Lett.*, 1987, **28**(*41*), 4809-4812



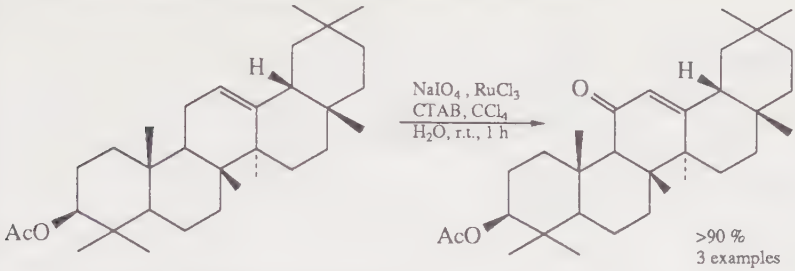
95 %
8 examples

77. Ruthenium(III) chloride

CAS Registry Number	10049-08-8, 14898-67-0 (hydrate)
CAS Name	Ruthenium chloride ($RuCl_3$)
Molecular Formula	$RuCl_3$
Molecular Weight	207.43, 261.47 (trihydrate)
Boiling Point	Not available.
Melting Point	500°C (dec.)
Density	3.110 kg/m^3
Refractive Index	Not available.
Safety and Handling	Corrosive. Hygroscopic.
Reactions	Catalyst for NaOH induced rearrangment of *sec*-allyl alcohols to saturated ketones.
Availability	Aldrich: £££; hydrate, £££. Lancaster Synthesis: hydrate, ££, bulk prices available. Johnson Matthey: hydrate, crystalline powder, ££; aq. soln, £££.

Phase transfer-catalyzed allylic oxidation by sodium periodate

C. Singh, *Indian J. Chem., Sect. B*, 1985, **24**(*8*), 859

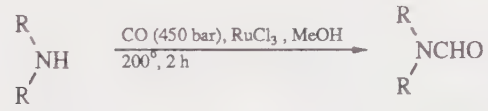


>90 %
3 examples

CTAB = cetyltrimethylammonium bromide

Synthesis of dialkylformamides

G. Bitsi, G. Jenner*, *J. Organomet. Chem.*, 1987, **330**(*3*), 429-435

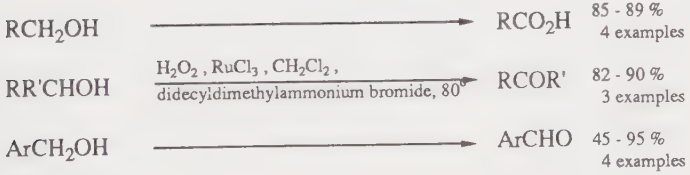


R = alkyl

5 - 95 % conversion
80 - 89 % selectivity
6 examples

Selective oxidation of alcohols by a hydrogen peroxide-ruthenium chloride system under phase-transfer conditions

G. Barak, J. Dakka, Y. Sasson*, *J. Org. Chem.*, 1988, **53**(*15*), 3553-3555

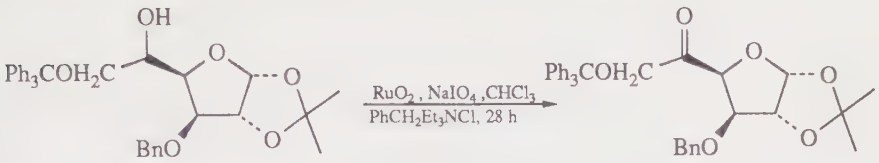


78. Ruthenium(IV) oxide

CAS Registry Number	12036-10-1, 32740-79-7 (hydrate)
CAS Name	Ruthenium oxide (RuO_2)
Molecular Formula	RuO_2
Molecular Weight	133.07
Boiling Point	Not available.
Melting Point	Not available.
Density	6.970 kg/m^3
Refractive Index	Not available.
Safety and Handling	Hygroscopic.
Reactions	Oxidation. In-situ generation of ruthenium tetroxide. Review: *Rev. Pure Appl. Chem.*, 1972, **22**, 47-54.
Availability	Aldrich: 99.9%, £££; hydrate, £££. Johnson Matthey: hydrate, powder, £££; anhydrous, £££.

Phase-transfer promoted oxidation of secondary alcohols to ketones

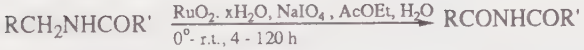
P. E. Morris, Jr., D. E. Kiely*, *J. Org. Chem.*, 1987, **52**(*6*), 1149-1152



97 %
6 examples

Ruthenium oxide oxidation of *N*-acyl alkylamines for imide synthesis

K. Tanaka*, S. Yoshifuji, Y. Nitta, *Chem. Pharm. Bull.*, 1987, **35**(*1*), 364-369

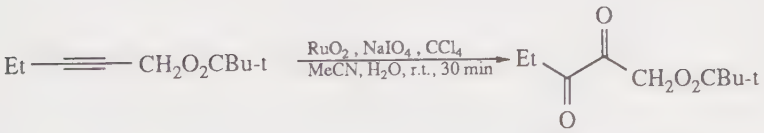


R = alkyl, aryl
R'= alkyl

25 - 96 %
11 examples

Preparation of 1,2-diketones from acetylenes via a mild oxidation method

R. Zibuck, D. Seebach*, *Helv. Chim. Acta*, 1988, **71**(*1*), 237-240



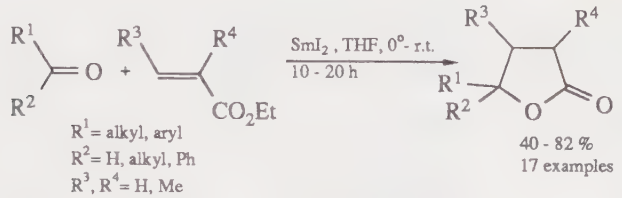
82 %
10 examples

79. Samarium(II) iodide

CAS Registry Number	32248-43-4
CAS Name	Samarium iodide (SmI_2)
Molecular Formula	SmI_2
Molecular Weight	404.16
Boiling Point	1580°C
Melting Point	527°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Prepared *in situ* from Sm metal and ICH_2CH_2I in THF: *J. Am. Chem. Soc.*, 1980, **102**(*8*), 2693-2698. Coupling catalyst. Reduction. As electron donor: *J. Chem. Soc. Chem. Commun.*, 1982, (*12*), 709-710.
Availability	Johnson Matthey: ultra dry (ampoule under Ar), 99.99%, £££.

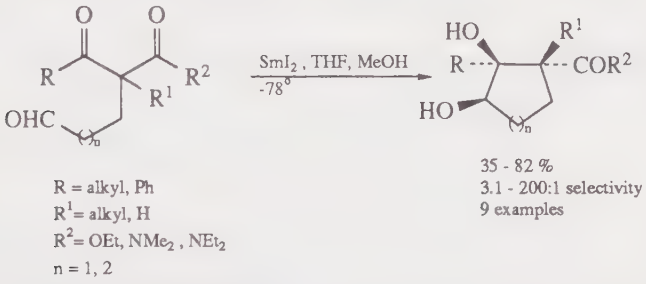
Samarium diiodide induced reductive coupling of α,β-unsaturated esters with carbonyl compounds: γ-lactone synthesis

S. Fukuzawa*, A. Nakanishi, T. Fujinami, S. Sakai, *J. Chem. Soc., Perkin Trans. 1*, 1988, (*7*), 1669-1675



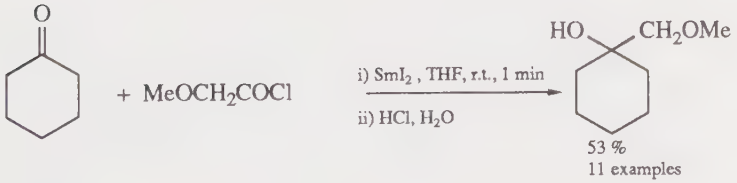
Samarium diiodide promoted intramolecular pinacolic coupling reactions

G. A. Molander*, C. Kenny, *J. Org. Chem.*, 1988, **53**(*9*), 2132-2134



New synthesis of 1,2-glycol monoethers via samarium diiodide mediated decarbonylation of α-alkoxy acid chlorides

M. Sasaki, J. Collin, H. B. Kagan*, *Tetrahedron Lett.*, 1988, **28**(*38*), 4847-4850

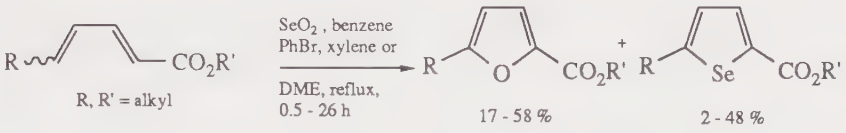


80. Selenium(IV) oxide (Selenium dioxide)

CAS Registry Number	7446-08-4
CAS Name	Selenium oxide (SeO_2)
Molecular Formula	SeO_2
Molecular Weight	110.96
Boiling Point	Not available.
Melting Point	315°C (subl.)
Density	3.950 kg/m^3
Refractive Index	Not available.
Safety and Handling	Highly toxic. Corrosive. Irritant to respiratory system, eyes and skin.
Reactions	Oxidation. Reagent for allylic oxidation of alkenes and acetylenes.
Availability	Aldrich: 99.999%, ££; 99.9+%, p; 99.8%, p; 99%, p. Lancaster Synthesis: 99.8%, p, bulk prices available. Johnson Matthey: powder, Specpure™, ££; powder, 99%, p. Sigma: white to pink crystals, p.

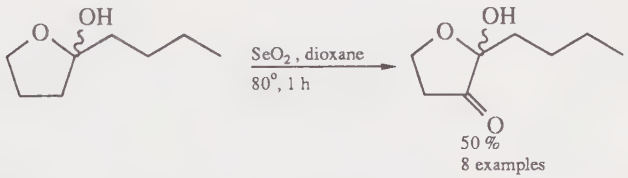
Oxidation of 2,4-alkadienoic esters with selenium dioxide. Synthesis of furans and selenophenes

S. Tsuboi, S. Mimura, S. Ono, K. Watanabe, A. Takeda*, *Bull. Chem. Soc. Jpn.*, 1987, **60**(*5*), 1807-1812



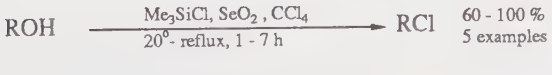
Oxidation of cyclic hemiacetals with selenium dioxide

K. Kanai*, I. Tomoskozi, *Synthesis*, 1988, (*7*), 544-545



Selenium dioxide-catalyzed conversion of alcohols to alkyl chlorides by chlorotrimethylsilane

J. G. Lee*, K. K. Kang, *J. Org. Chem.*, 1988, **53**(*15*), 3634-3637



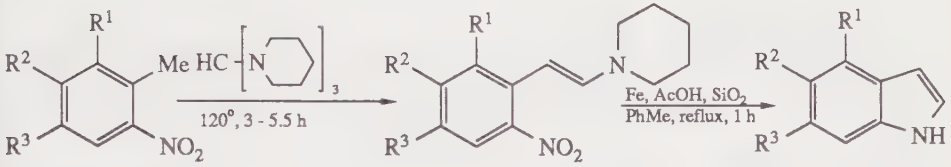
ROH = primary, secondary or tertiary alcohol

81. Silica gel

CAS Registry Number	7631-86-9
CAS Name	Silica gel
Molecular Formula	$(SiO_2)_n$
Molecular Weight	60.09 (SiO_2)
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Hygroscopic.
Reactions	Chromatographic applications. Catalyst for cyclization. Drying agent. Inert catalyst support.
Availability	Aldrich: Wide variety of grades and mesh/particle sizes for chromatographic applications, many 99+%, bulk price range (1-10kg) ~£10-£100. Sigma: Variety of types and mesh/particle sizes for chromatographic applications, price range (10g-5kg) ~£5-£250; for desiccation and humidity indicators, price range (250g-5kg) ~£5-£60.

Silica gel assisted reductive cyclization of nitropiperidinostyrenes to indoles

M. Kawase, A. K. Sinhababu, R. T. Borchardt*, *J. Heterocyclic Chem.*, 1987, **24**(*6*), 1499-1501

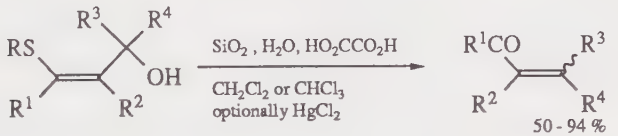


R^1- R^3= H, alkoxy, halo

62 - 94 %
7 examples

Use of moist silica gel for obtaining α-ethylenic carbonyl compounds from β-alkylthio or β-phenylthio allylic alcohols

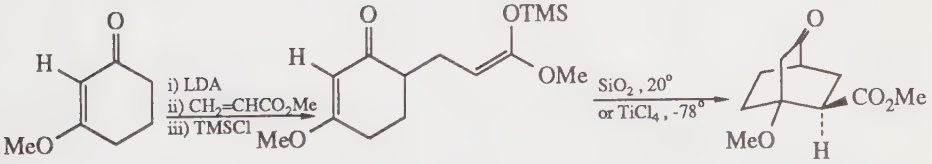
M. Pellet*, F. Huet, *Tetrahedron*, 1988, **44**(*14*), 4463-4468



50 - 94 %
7 examples

Silica gel catalyzed cyclizations of mixed ketene acetals

D. Schinzer*, M. Kalesse, J. Kabbara, *Tetrahedron Lett.*, 1988, **29**(*41*), 5241-5244



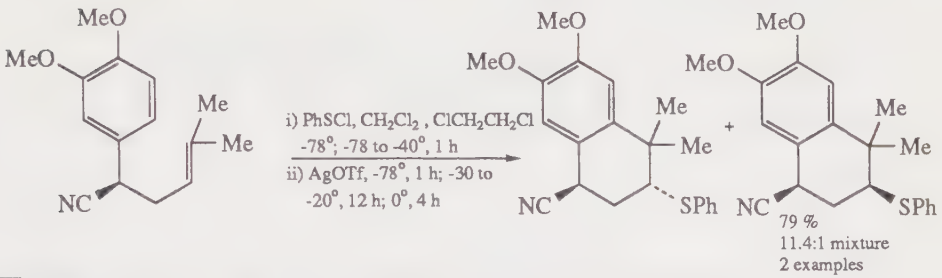
>98 %, 72 % e.e.
6 examples

82. Silver trifluoromethanesulphonate (Silver triflate)

CAS Registry Number	2923-28-6
CAS Name	Trifluoromethanesulfonic acid, silver salt
Molecular Formula	CF_3SO_3Ag
Molecular Weight	256.94
Boiling Point	Not available.
Melting Point	356°
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Irritant. Light sensitive. Moisture sensitive.
Reactions	Cyclization. Precursor to alkyl methanesulphonates - alkylating agents for aromatic compounds. Review: *Chem. Rev.*, 1977, **77**, 69.
Availability	Aldrich: 99+%, ££. Lancaster Synthesis: 99%, ££, bulk prices available.

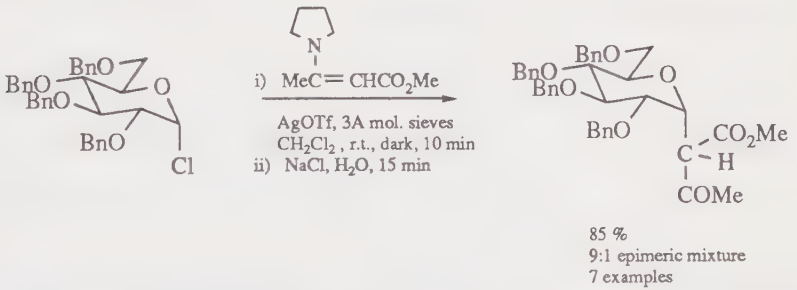
Synthesis of functionalized carbocycles via silver ion assisted episulphonium ion cyclization

E. Edstrom, T. Livinghouse*, *J. Chem. Soc., Chem. Commun.*, 1986, (*4*), 279-280



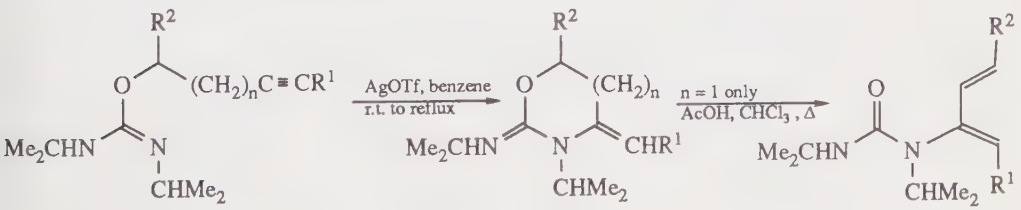
C-Glucosidation of β-keto esters and ketones via enamines

P. Allevi*, M. Anastasia, P. Ciuffreda, A. Fiecchi, A. Scala, *J. Chem. Soc., Chem. Commun.*, 1988, (*1*), 57-58



Diastereoselective, silver(I)-catalyzed cyclizations of acetylenic isoureas to oxazolidines and oxazines; acetic acid-induced conversion of the alkylideneoxazines to 2-*N*-substituted (1*Z*,3*E*)-dienes

W. Clegg, S. P. Collingwood, B. T. Golding*, S. M. Hodgson, *J. Chem. Soc., Chem. Commun.*, 1988, (*17*), 1175-1176

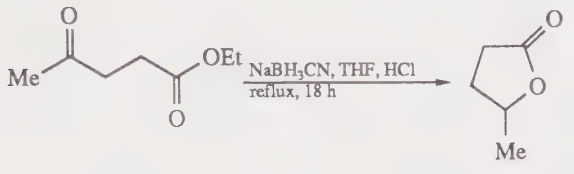


83. Sodium cyanoborohydride

CAS Registry Number	25895-60-7
CAS Name	Borate(1-), (cyano-*C*)trihydro-, sodium, (*T*-4)-
Molecular Formula	$NaBH_3CN$
Molecular Weight	62.84, 65.87 ($NaBD_3CN$)
Boiling Point	Not available.
Melting Point	242°C(dec.)
Density	1.083 kg/m^3 (NaOH soln)
Refractive Index	Not available.
Safety and Handling	Highly toxic. Flammable solid. Very hygroscopic.
Reactions	Highly selective reducing agent. Reductive cyclization. Ring cleavage. Reviews: *Synthesis*, 1975, 135; *Org. Prep. Proced. Int.*, 1979, **11**, 201.
Availability	Aldrich: 95%, £; 5M in aq. NaOH (1M), p; 1M in THF, under N_2 in Sure/Seal™ bottles, p. Also available: $NaBD_3CN$, £££. Lancaster Synthesis: 95%, £, bulk prices available. Sigma 90-95%, £. Also available: $NaBD_3CN$, £££.

Reductive cyclization of keto esters with sodium cyanoborohydride. Synthesis of γ- and δ-lactones

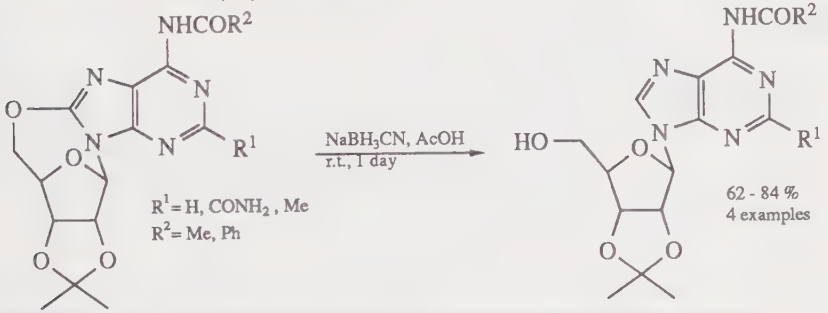
K. F. Podraza, *J. Heterocyclic Chem.*, 1987, **24**(*1*), 293-295



81 %
4 examples

Reductive ring cleavage of cycloadenosines

M. Sako, T. Saito, K. Kameyama, K. Hirota, Y. Maki*, *J. Chem. Soc., Chem. Commun.*, 1987, (*17*), 1298-1299

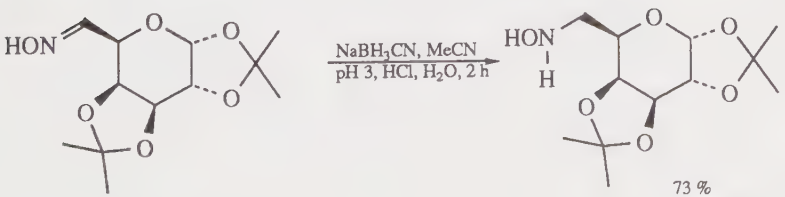


R^1 = H, $CONH_2$, Me
R^2 = Me, Ph

62 - 84 %
4 examples

Reduction of sugar aldoximes to terminal deoxy hydroxyamino sugars

J. M. J. Tronchet*, G. Zosimo-Landolfo, N. Bizzozero, D. Cabrini, F. Habashi, E. Jean, M. Geoffroy, *J. Carbohydr. Chem.*, 1988, **7**(*1*), 169-186



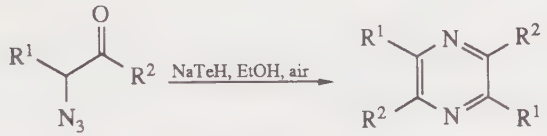
73 %
12 examples

84. Sodium hydrogen telluride

CAS Registry Number	65312-92-7
CAS Name	Sodium hydrogen telluride
Molecular Formula	NaHTe
Molecular Weight	151.60
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Selective reduction. Debromination of vicinal dibromides. Synthesis of ^{123}Te-labelled radiopharmaceuticals.
Availability	Not commercially available.
Preparation	Prepared by heating to Te with excess $NaBH_4$ in EtOH under N_2, to give wine-coloured solution. D. H. R. Barton, S. W. Crombie, *J. Chem. Soc., Perkin Trans. 1*, 1975, (*16*), 1574.

Pyrazines from α-azido ketones

H. Suzuki*, T. Kawaguchi, T. Takaoka, *Bull. Chem. Soc. Jpn.*, 1986, **59**(2), 665-666

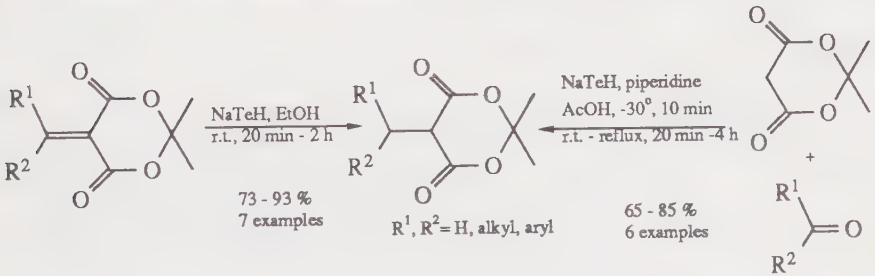


R^1, R^2 = H, alkyl

40 - 98 %
5 examples

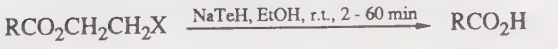
Synthesis of isopropylmalonates

X. Huang, L. Xie, *Synth. Commun.*, 1986, **16**(*13*), 1701-1707



Facile cleavage of haloethyl esters with sodium hydrogen telluride

J. Chen, X.-J. Zhou*, *Synth. Commun.*, 1987, **17**(2), 161-164



R = alkyl, aryl
X = Br, Cl

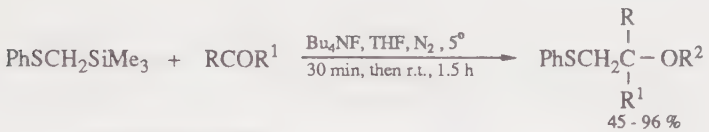
84 - 92 %
5 examples

85. Tetrabutylammonium fluoride (TBAF)

CAS Registry Number	429-41-4
CAS Name	Butylaminium, *N,N,N*-tributyl-, fluoride
Molecular Formula	$[Me(CH_2)_3]_4NF$
Molecular Weight	261.47, 315.52 (trihydrate)
Boiling Point	Not available.
Melting Point	62-63°C (trihydrate)
Density	0.903 kg/m^3
Refractive Index	Not available.
Safety and Handling	Irritant. Hygroscopic.
Reactions	Cleavage of silyl ethers. Efficient base. Effective reagent for fluoride-induced aldol condensation of silyl enol ethers with aldehydes: *J. Am. Chem. Soc.*, 1975, **99**, 3257; 1982, **104**, 1025. Review: *Chem. Rev.*, 1980, **80**, 429.
Availability	Aldrich: hydrate, 99%, £; 1M in THF (5 wt % H_2O), p. Lancaster Synthesis: 1M in THF, p, bulk prices available. Sigma: 1M in THF; trihydrate; enquire for details.

β-Hydroxyphenylsulphides by fluoride ion induced reaction of phenylthiomethyltrimethylsilane with aldehydes and ketones

J. Kitteringham*, M. B. Mitchell, *Tetrahedron Lett.*, 1988, **29**(*27*), 3319-3322

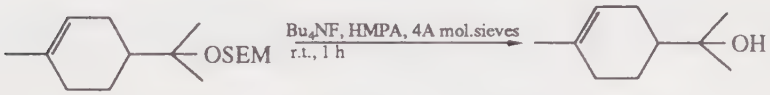


R = Ph, Me, CH=CHPh
R^1 = H, Me, Ph
R^2 = H, $SiMe_3$

45 - 96 %
7 examples

Effective deprotection of 2-(trimethylsilylethoxy)methyl ethers

T. Kan, M. Haslimoto, M. Yanaguja, H. Shirahama*, *Tetrahedron Lett.*, 1988, **29**(*42*), 5417-5418

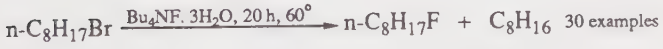


94 %
6 examples

SEM = 2-(trimethylsilylethoxy)methyl

Facile, efficient heterogeneous nucleophilic fluorination without solvent

G. Bram*, A. Loupy, P. Pigeon, *Synth. Commun.*, 1988, **18**(*14*), 1661-1667



71 % 13 %

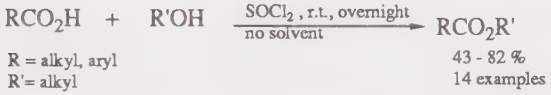
30 examples

86. Thionyl chloride (Sulphinyl chloride)

CAS Registry Number	7719-09-7
CAS Name	Thionyl chloride
Molecular Formula	$SOCl_2$
Molecular Weight	118.97
Boiling Point	79°C
Melting Point	-105°C
Density	1.631 kg/m^3
Refractive Index	1.5140
Safety and Handling	Corrosive. Irritating to respiratory system and lachrymatory. Reacts violently with water.
Reactions	Chlorination. Oxidation.
Availability	Aldrich: 99+%, p; 99+% (in poly-coated bottle), p; 97%, p; 97% (in poly-coated bottle), p; 2M in CH_2Cl_2, under N_2 in Sure/Seal™ bottles, p.

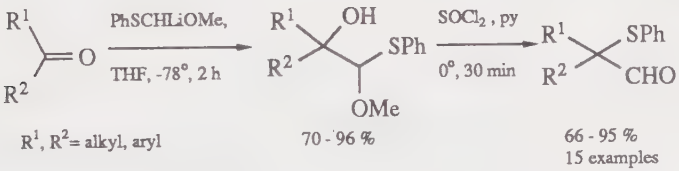
Esterification at room temperature in the absence of solvent

B. Kumar*, R. K. Verma, *Synth. Commun.*, 1984, **14**(*14*), 1359-1363



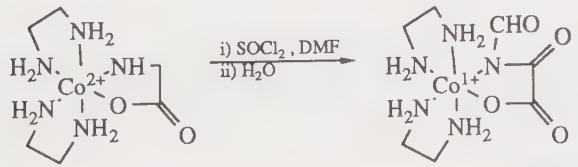
Synthesis of α-phenylthioaldehydes

B. J. M. Hansen, R. M. Peperzak, A. de Groot*, *Recl. Trav. Chim. Pays-Bas*, 1987, **106**(*9*), 489-494



Rapid oxidation of amino acids, coordinated to cobalt(III), to imines and amines by thionyl chloride in DMF

A. Hammershoi, R. M. Hartshorn, A. M. Sargeson, *J. Chem. Soc., Chem. Commun.*, 1988, (*18*), 1226-1227

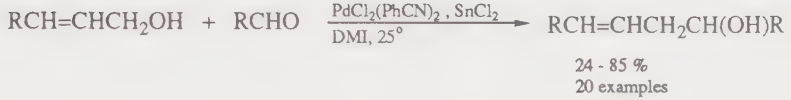


87. Tin(II) chloride

CAS Registry Number	7772-99-8, 10025-69-1 (dihydrate)
CAS Name	Stannane, dichloro-
Molecular Formula	$SnCl_2$
Molecular Weight	189.60, 225.63 (dihydrate)
Boiling Point	652°C
Melting Point	246°C, 41-43°C (dihydrate)
Density	3.950 kg/m^3, 2.710 kg/m^3 (dihydrate)
Refractive Index	Not available.
Safety and Handling	Corrosive. Moisture sensitive.
Reactions	Allylation catalyst. Review: P. J. Smith, D. V. Sanghani, K. D. Bos, J. D. Donaldson, *Chem. Ind. (London)*, 1984, (*5*), 167-172.
Availability	Aldrich: 99.99+%, ff; anhydrous, 98%, p; dihydrate, 98%, ACS reagent, p; dihydrate, p. Lancaster Synthesis: dihydrate, p, bulk prices available. Johnson Matthey: dihydrate, crystalline, Specpure™, p.

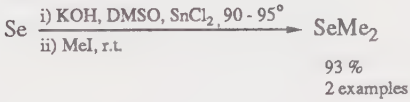
Palladium-catalyzed carbonyl allylation by allylic alcohols with tin(II) chloride

Y. Masuyama*, J. P. Takahara, Y. Kurusa, *J. Am. Chem. Soc.*, 1988, **110**(*13*), 4473-4474



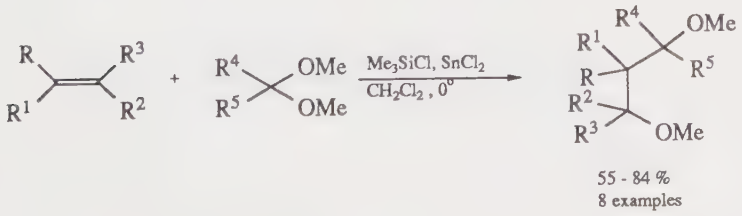
Convenient synthesis of dimethyl selenide

M. G. Voronkov*, V. K. Stankevich, P. A. Podkuiko, N. A. Korchevin, E. N. Deryagina, B. A. Trofimov, *J. Gen. Chem. USSR*, 1987, **57**(*10,2*), 2144-2145



Addition of acetals to activated olefins under extremely mild conditions

T. Mukaiyama*, K. Wariishi, Y. Saito, M. Hayashi, S. Kobayashi, *Chem. Lett.*, 1988, (*7*), 1101-1104

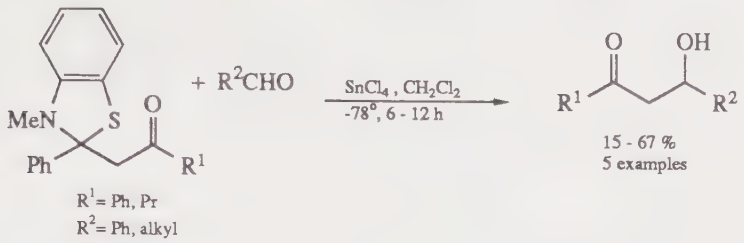


88. Tin(IV) chloride (Stannic chloride, tin tetrachloride)

CAS Registry Number	7646-78-8, 10026-06-9 (pentahydrate)
CAS Name	Stannane, tetrachloro-
Molecular Formula	$SnCl_4$
Molecular Weight	260.50, 350.58 (pentahydrate)
Boiling Point	114.1°C
Melting Point	-33°C
Density	2.226 kg/m^3
Refractive Index	1.512
Safety and Handling	Corrosive. Irritating to respiratory system, eyes and skin. Moisture sensitive.
Reactions	Lewis acid catalyst.
Availability	Aldrich: 99.999%, £; anhydrous, 99%, under N_2 in Sure/Seal™ bottles, p; 1M in CH_2Cl_2, under N_2 in Sure/Seal™ bottles, p; pentahydrate, 98+%, p. Johnson Matthey: anhydrous, liquid (ampoule), Specpure®, p.

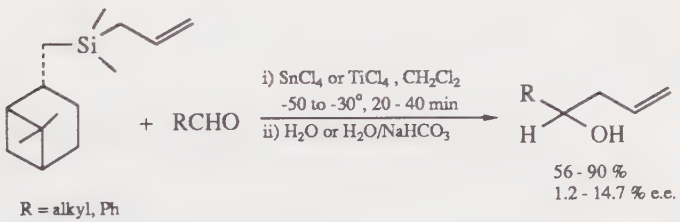
Aldol reaction with methylphenyl(oxoalkyl)benzothiazoline as an enolate transferring reagent

H. Chikashita*, S. Tame, K. Itoh, *Heterocycles*, 1988, **27**(*1*), 67-70



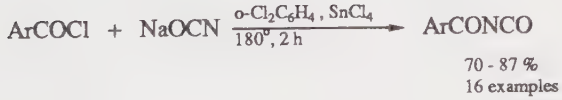
The asymmetric reaction of a chiral allylsilane with aldehydes

G.-L. Yi, D. Wang*, T. H. Chen, *Youji Huaxue*, 1988, **8**(*2*), 115-120



Preparation of acyl isocyanates by zinc or tin catalyzed condensation of acyl chlorides with sodium cyanate

M.-Z. Deng, P. Caubere*, J. P. Senet, S. Lecolier, Tetrahedron, *1988*, **44**(*19*), 6079-6086

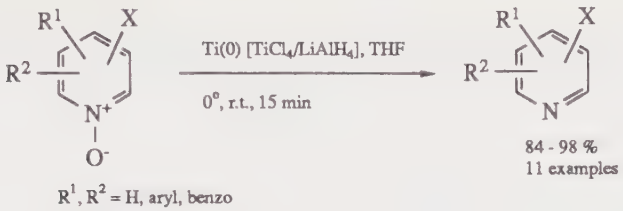


89. Titanium(0)

CAS Registry Number	Not available.
CAS Name	Not available.
Molecular Formula	Not available.
Molecular Weight	Not available.
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Reduction. Reductive coupling of carbonyl compounds ("McMurry reaction"). Reviews: J. E. McMurry, *Acc. Chem. Res.*, 1983, **16**, 405-411; R. Dams, M. Malinowski, I. Westdorp, H. Y. Geise*, *J. Org. Chem.*, 1982, **47**, 248-259.
Availability	Not commercially available.
Preparation	Titanium(0) is generated *in situ* from reaction of $TiCl_4$ or $TiCl_3$ with strong reducing agents in THF.
Other Preparations	J. E. McMurry, *Acc. Chem. Res.*, 1974, **7**, 281; T. Mukaiyama, T. Sato, J. Hanna, *Chem. Lett.*, 1973, 1041; S. Tyrlik, I. Wolochowicz, *Bull. Soc. Chim. Fr.*, 1973, 2147.

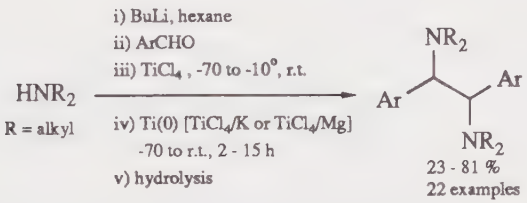
Deoxygenation of halogen-containing heteroaromatic *N*-oxides

M. Malinowski*, L. Kaczmarek, *Synthesis*, 1987, (*11*), 1013-1015



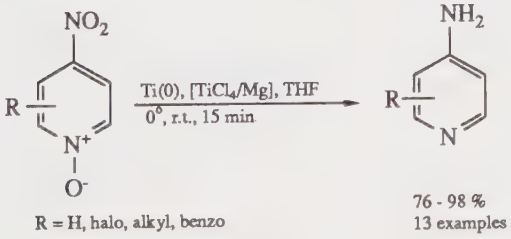
Preparation of diarylethylenediamines by aminative reductive coupling of benzaldehydes with low valency titanium reagents

C. Betschart, D. Seebach*, *Helv. Chim. Acta*, 1987, **70**(*8*), 2215-2231



A convenient reduction of nitropyridine *N*-oxides to pyridinamines with titanium(0) reagent

M. Malinowski*, L. Kaczmarek, *J. Prakt. Chem.*, 1988, **330**(*1*), 154-158

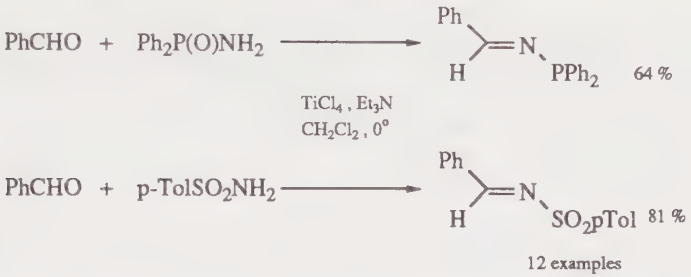


90. Titanium(IV) chloride (Titanic chloride, titanium tetrachloride)

CAS Registry Number	7550-45-0
CAS Name	Titanium chloride ($TiCl_4$)
Molecular Formula	$TiCl_4$
Molecular Weight	189.71
Boiling Point	136.4°C
Melting Point	-24°C
Density	1.730 kg/m^3
Refractive Index	1.61
Safety and Handling	Highly toxic. Corrosive. Irritating to eyes and respiratory system. Reacts violently with water.
Reactions	Reduction. Condensation. Lewis acid catalyst. Review: T. Mukaiyama, M. Murakami, *Croat. Chem. Acta*, 1986, **59**(*1*), 221-235.
Availability	Aldrich: 99.995+%, ff; 99.9%, under N_2 in Sure/Seal™ bottles, p; 1M in CH_2Cl_2, under N_2 in Sure/Seal™ bottles, p.

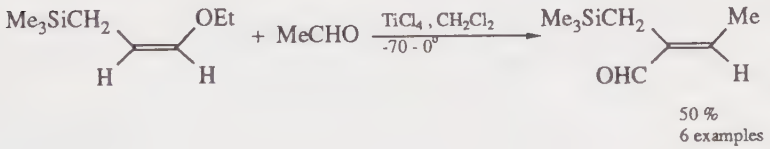
An efficient preparation of *N*-phosphinoyl and *N*-sulphonyl imines directly from aromatic aldehydes

W. B. Jennings*, C. J. Lovely, *Tetrahedron Lett.*, 1988, **29**(*30*), 3725-3728



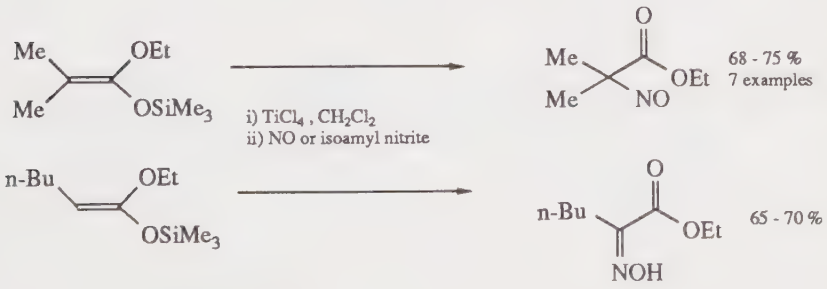
One-pot synthesis of allyl and alkyltrimethylsilanes

J. Pornet, A. Rayadh, L. Miginiac*, *Tetrahedron Lett.*, 1988, **29**(*37*), 4717-4718



New synthesis of α-nitroso esters and α-keto ester oximes

S. M. Ali, Y. Matsuda, S. Tanimoto*, *Synthesis*, 1988, (*10*), 805-806

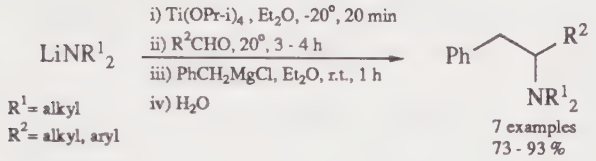


91. Titanium(IV) isopropoxide (Tetraisopropyl orthotitanate)

CAS Registry Number	546-68-9
CAS Name	2-Propanol, titanium(4+) salt
Molecular Formula	$(Me_2CHO)_4Ti$
Molecular Weight	284.26
Boiling Point	218°C/10 mmHg
Melting Point	18-20°C
Density	0.955 kg/m^3
Refractive Index	1.4654
Safety and Handling	Flammable liquid. Moisture sensitive.
Reactions	Catalyst for ring opening of epoxy alcohols and acids. Reviews: *Chem. Rev.*, 1961, **61**, 1; *Top. Cur. Chem.*, 1982, **106**, 3.
Availability	Aldrich: p. Lancaster Synthesis: 95%, p, bulk prices available.

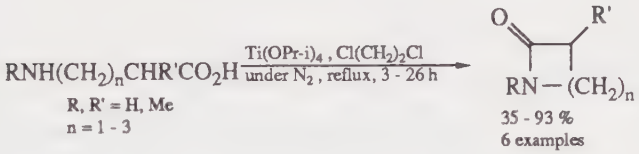
Synthesis of α-substituted phenethylamines via titanium amide complexes

H. Takahashi*, T. Tsubuki, K. Higashiyama, *Synthesis*, 1988, (*3*), 238-240



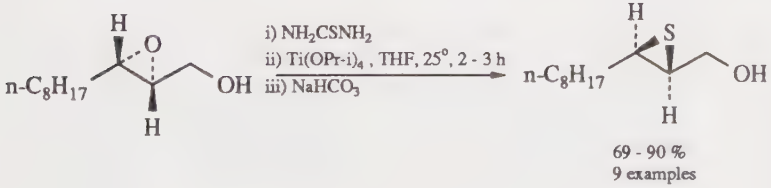
Preparation of lactams via titanium(IV) isopropoxide mediated cyclization

M. Mader, P. Helquist, *Tetrahedron Lett.*, 1988, **29**(*25*), 3049-3052



Mild and selective synthesis of homochiral *trans*-2,3-epithioalcohols from chiral *trans*-2,3-epoxyalcohols in the presence of titanium(IV) isopropoxide

Y. Gao, B. Sharpless*, *J. Org. Chem.*, 1988, **53**(*17*), 4114-4116

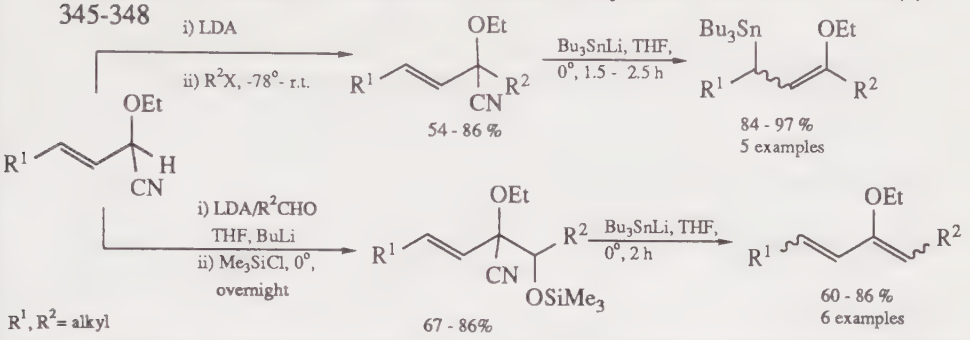


92. Tributylstannyllithium

CAS Registry Number	17946-71-3
CAS Name	Lithium, (tributylstannyl)-
Molecular Formula	$[Me(CH_2)_3]_3SnLi$
Molecular Weight	Not available.
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Stannylation: W. C. Still, *J. Am. Chem. Soc.*, 1977, 99(*14*), 4836-4838. Reaction with α,β-enones: *J. Org. Chem.*, 1988, **53**(*9*), 1894-1899.
Availability	Not commercially available.
Preparation	*J. Organomet. Chem.*, 1968, **11**(*2*), 271-280.

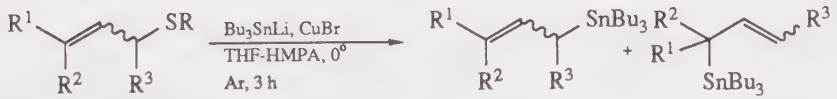
Preparation of γ-ethoxyallylstannanes and dienol ethers

T. Takeda*, K. Ando, H. Ohshima, M. Inoue, T. Fujiwara, *Chem. Lett.*, 1986, (*3*), 345-348



Desulphurizative stannylation of allyl sulphides using tributylstannyllithium

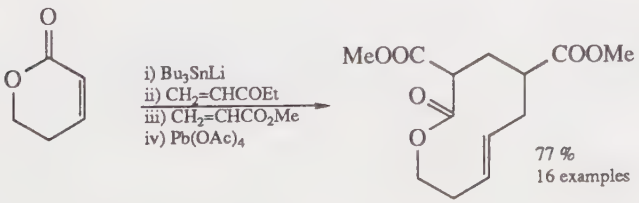
T. Takeda*, S. Ogawa, N. Ohta, T. Fujiwara, *Chem. Lett.*, 1987, (*10*), 1967-1970



R = alkyl, hetrocycle, Me_2NCS-
R^1- R^3= H, alkyl

One-pot synthesis of unsaturated macrolides, and substituted aromatics and heteroaromatics, via successive Michael reactions followed by ring closure annulation

G. H. Posner*, K. S. Webb, E. Asirvatham, S. Jew, A. Degl'Innocenti, *J. Am. Chem. Soc.*, 1988, **110**(*14*), 4754-4762

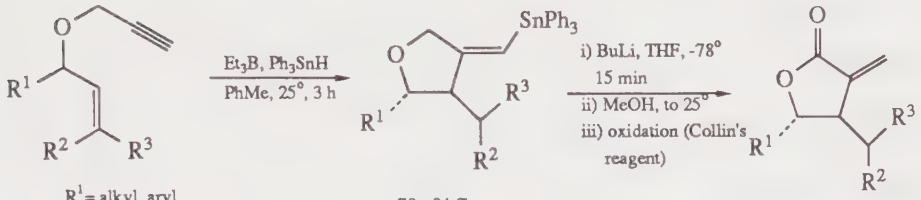


93. Triethylborane

CAS Registry Number	97-94-9
CAS Name	Borane, triethyl-
Molecular Formula	Et_3B
Molecular Weight	98.00
Boiling Point	95°C
Melting Point	-93°C
Density	0.677 kg/m^3
Refractive Index	1.3971
Safety and Handling	Toxic. Pyrophoric.
Reactions	Catalyst in free radical reactions for addition to multiple bonds.
Availability	Aldrich: under N_2 in Sure/Pac™ cylinders, p; 1M in hexanes, p; 1M in THF, p, both under N_2 in Sure/Seal™ bottles.

Synthesis of α-methylene-γ-butyrolactones

K. Nozaki, K. Oshima*, K. Utimoto, *Bull. Chem. Soc. Jpn.*, 1987, **60**(*9*), 3465-3467



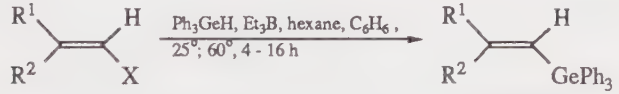
R^1 = alkyl, aryl
R^2, R^3 = H, alkyl

70 - 84 %

31 - 59 %
5 examples

Free-radical substitution reactions for interconversion of alkenyl sulphides, -germanes, and -stannanes

Y. Ichinose, K. Oshima*, K. Utimoto, *Chem. Lett.*, 1988, (*4*), 669-672

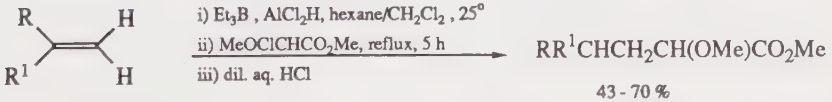


65 - 94 %

R^1, R^2 = H, alkyl, aryl
X = SPh, $SnPh_3$

A convenient route to α-alkoxy esters from olefins through organoborane-catalyzed hydroalumination

K. Maruoka, K. Shinoda, H. Yamamoto*, *Synth. Commun.*, 1988, **18**(*10*), 1029-1033



43 - 70 %
4 examples

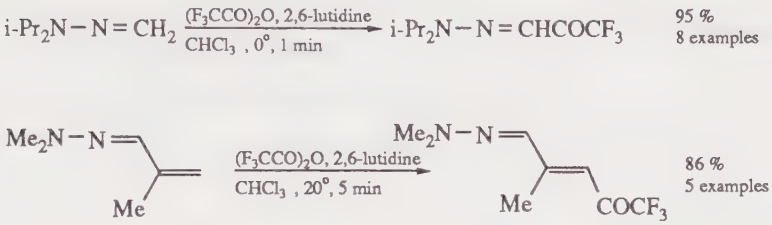
R, R^1 = H, alkyl

94. Trifluoroacetic anhydride

CAS Registry Number	407-25-0
CAS Name	Acetic acid, trifluoro-, anhydride
Molecular Formula	$(CF_3CO)_2O$
Molecular Weight	210.03
Boiling Point	39.5-40°C
Melting Point	-65°C
Density	1.487 kg/m^3
Refractive Index	not available
Safety and Handling	Corrosive. Harmful by inhalation. Moisture sensitive.
Reactions	Preparation of *N*- and *O*-trifluoroacetyl derivatives for GC analysis. Catalyst for esterification. Review: *Chem. Rev.*, 1955, **55**, 787.
Availability	Aldrich: 99+%, p. Lancaster Synthesis: 99+%, p, bulk prices available. Sigma: approx. 99%, p.

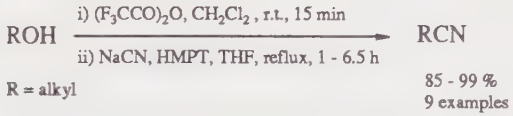
Acylation of aliphatic aldehyde hydrazones

Y. Kamitori, M. Hojo*, R. Msuda, T. Yoshida, S. Ohara, K. Yamada, N. Yoshikawa, *J. Org. Chem.*, 1988, **53**(*3*), 519-526



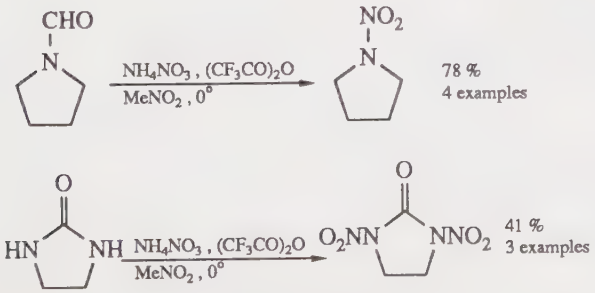
A one-pot synthesis of nitriles from alcohols

F. Camps*, V. Gasol, A. Guerrero, *Synth. Commun.*, 1988, **18**(*4*), 445-452



Ammonium nitrate/trifluoroacetic anhydride as a convenient reagent for *N*-nitration

C. Suri*, R. D. Chapman, *Synthesis*, 1988, (*9*), 743-745

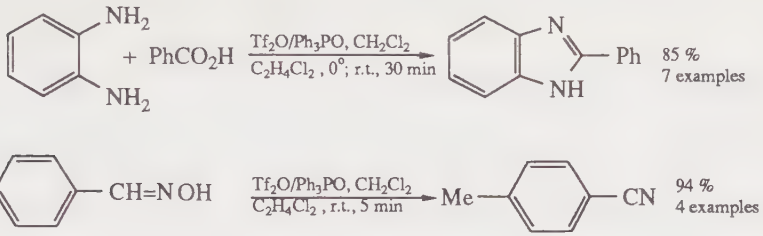


95. Trifluoromethanesulphonic anhydride (Triflic anhydride)

CAS Registry Number	358-23-6
CAS Name	Methanesulfonic acid, trifluoro-, anhydride
Molecular Formula	$(CF_3SO_2)_2O$
Molecular Weight	282.13
Boiling Point	81-83°C/745 mmHg
Melting Point	Not available.
Density	1.677 kg/m^3
Refractive Index	1.3212
Safety and Handling	Corrosive. Moisture sensitive.
Reactions	Catalyst for oxidation of alcohols by DMSO. Synthesis of alkyl and aryl triflates. Reviews: *Aldrichim. Acta*, 1983, **16**(*1*), 15; *Acc. Chem. Res.*, 1977, **10** 306.
Availability	Aldrich: ££. Lancaster Synthesis: 98+%, ££, bulk prices available. Sigma: ££.

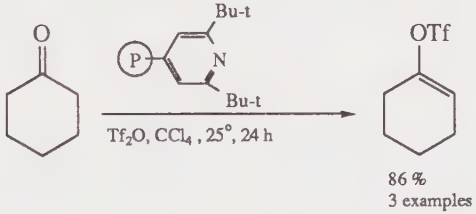
Dehydration reactions with 'phosphonium anhydride' reagents

J. B. Hendrickson*, M. S. Hussoin, *J. Org. Chem.*, 1987, **52**(*18*), 4137-4139



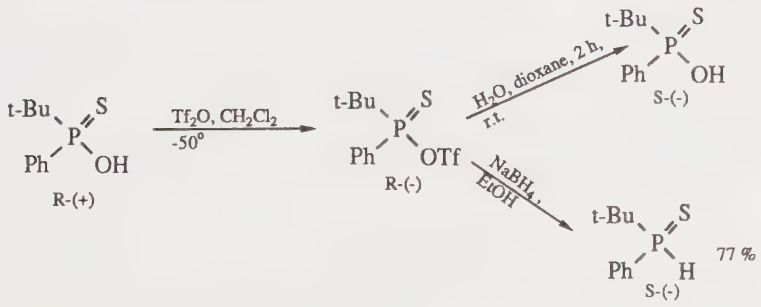
Synthesis of vinyl triflates using polymer-bound di-*tert*-butylpyridine

M. E. Wright*, S. R. Pulley, *J. Org. Chem.*, 1987, **52**(*22*), 5036-5037



Synthesis of optically active *tert*-butylphenylphosphine sulphide, a source of new optically active organophosphorus compounds

Z. Skzypczynski, J. Michalski*, *J. Org. Chem.*, 1988, **53**(*19*), 4549-4551

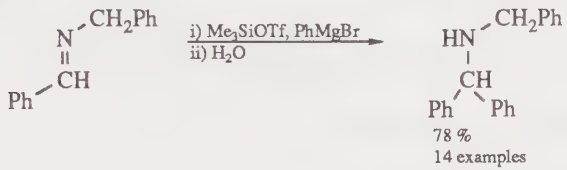


96. Trimethylsilyl trifluoromethanesulphonate (Trimethylsilyl triflate)

CAS Registry Number	27607-77-8
CAS Name	Methanesulfonic acid, trifluoro-, trimethylsilyl ester
Molecular Formula	$CF_3SO_3SiMe_3$
Molecular Weight	222.26
Boiling Point	77°C/80 mmHg, 39-40°/12 mmHg
Melting Point	Not available.
Density	1.150 kg/m^3
Refractive Index	Not available.
Safety and Handling	Corrosive. Flammable. Very hygroscopic.
Reactions	Silylation. Review: *Aldrichim. Acta*, 1983, **16**(*1*), 15; 1984, **17**(*3*), 72; *Synthesis*, 1982, 1.
Availability	Aldrich: 99%, £. Lancaster Synthesis: 99%, £, bulk prices available. Sigma: Enquire for details.

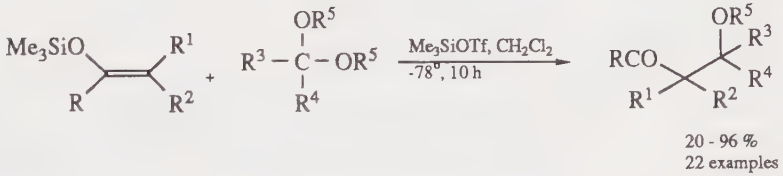
Trimethylsilyl trifluoromethanesulphonate as activating agent for nucleophilic reactions between imines and Grignard reagents

M. A. Brook*, Jahangir, *Synth. Commun.*, 1988, **18**(*9*), 893-898



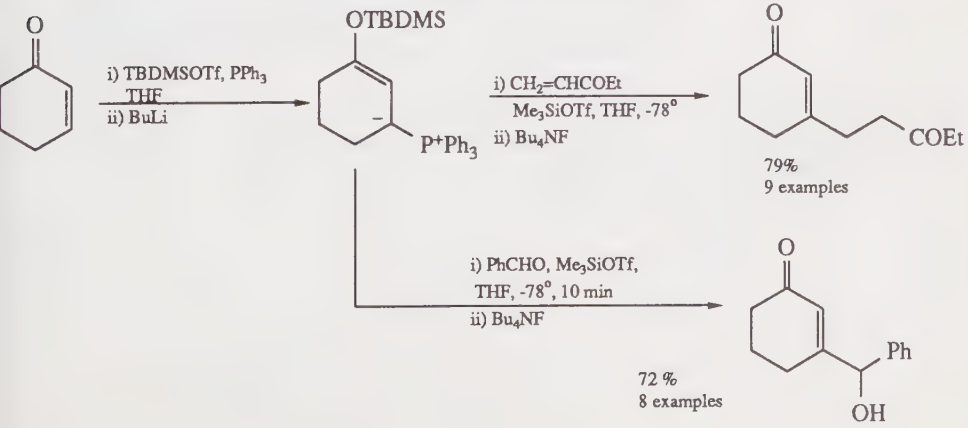
Trimethylsilyl triflate-catalyzed aldol-type reactions of enol silyl ethers and acetals or related compounds

S. Murata, M. Suzuki, R. Noyori*, *Tetrahedron*, 1988, **44**(*13*), 4259-4275



New methods of β-conjugate addition and β-hydroxyalkylation of enones

S. Kim*, P. H. Lee, *Tetrahedron Lett.*, 1988, **29**(*42*), 5413-5416

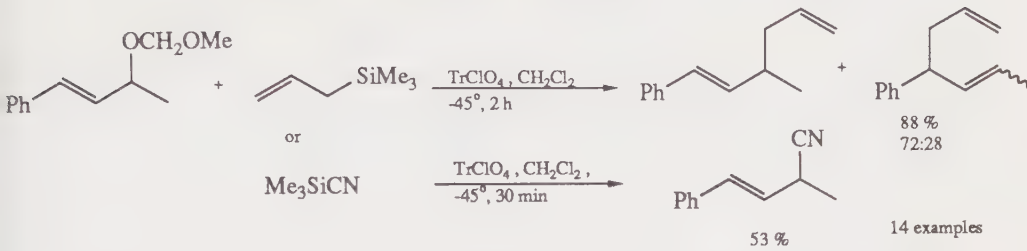


97. Triphenylmethyl perchlorate (Trityl perchlorate)

CAS Registry Number	3058-33-1
CAS Name	Methylium, triphenyl-, perchlorate
Molecular Formula	Ph_3CClO_4
Molecular Weight	342.78
Boiling Point	Not available.
Melting Point	143°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Potentially explosive.
Reactions	Addition catalyst. Cyclization catalyst. Review: T. Mukaiyama, M. Murakami, *Croat. Chem. Acta*, 1986, **59**(*1*), 221-235.
Availability	Not commercially available.
Preparation	Prepared by reaction of trityl chloride and silver perchlorate in nitrobenzene with precipitation on addition of benzene, or from trityl chloride or triphenylcarbinol in nitrobenzene or ether and perchloric acid followed by removal of all water.
Other Preparations	Improved preparation by Dauben *et al.*, *J. Org. Chem.*, 1960, **25**, 1442.

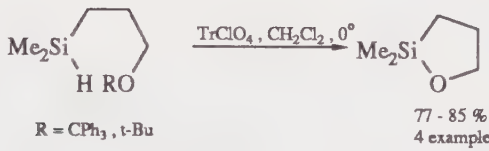
Facile synthesis of 1,5-dienes and β,γ-unsaturated nitriles via trityl perchlorate catalyzed addition

M. Murakami, T. Kato, T. Mukaiyama, *Chem. Lett.*, 1987, (*6*), 1167-1170



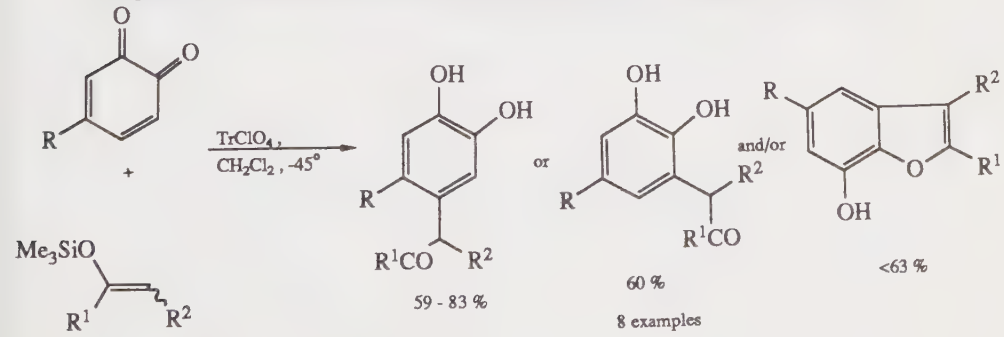
Trityl cation catalyzed cyclization of alkoxyalkyl- and alkoxyalkenylsilanes

Y.-L. Chen, T. J. Barton*, *Organometallics*, 1987, **6**(*12*), 2590-2592



Regioselective addition of 1,2-benzoquinones to silyl enol ethers catalyzed by trityl perchlorate

Y. Sagawa*, S. Kobayashi, T. Mukaiyama, *Chem. Lett.*, 1988, (*7*), 1105-1108

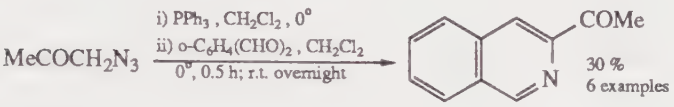


98. Triphenylphosphine

CAS Registry Number	603-35-0
CAS Name	Phosphine, triphenyl-
Molecular Formula	Ph_3P
Molecular Weight	262.29
Boiling Point	377°C
Melting Point	79-81°C
Density	1.0749 kg/m^3
Refractive Index	1.6358
Safety and Handling	Irritant.
Reactions	Versatile reducing agent. Reagent for preparation of triphenylphosphonium salts (Wittig). Review: *Organophosphorus Reagents in Organic Synthesis*, ed. J. I. G. Cadogan, Academic Press, 1979.
Availability	Aldrich: 99%, p; polymer-supported (polystyrene + DVB), £££. Also available as borane complex. Lancaster Synthesis: 99%, p, bulk prices available. Sigma: crystalline, p.

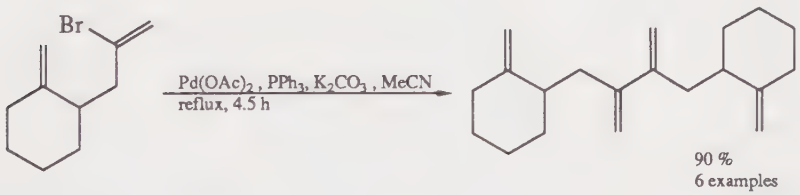
Synthesis of isoquinolines by condensation of iminophosphoranes with *o*-phthalaldehyde

T. Aubert, M. Farnier, B. Hanquet, R. Guilard*, *Synth. Commun.*, 1987, **17**(*15*), 1831-1837



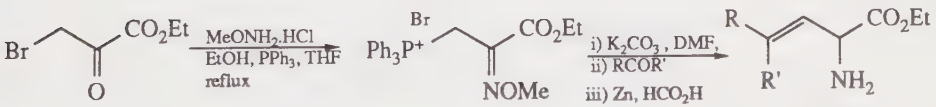
Regiospecific formation of dienes by the palladium-catalyzed inter- and intramolecular coupling of vinyl halides

R. Grigg*, P. Stevenson, T. Worakun, *Tetrahedron*, 1988, **44**(*7*), 2049-2054



Novel phosphorane and phosphonate synthons for vinyl glycines

A. J. Bicknell, G. Burton, J. S. Elder*, *Tetrahedron Lett.*, 1988, **29**(*27*), 3361-3364



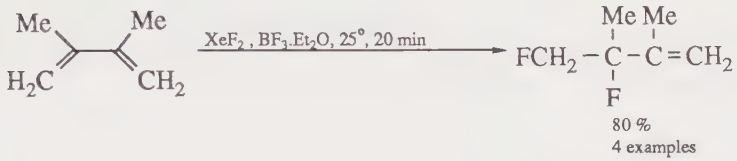
R = alkyl, aryl
R'= H, alkyl
RR'= cycloalkyl

99. Xenon difluoride

CAS Registry Number	13709-36-9
CAS Name	Xenon fluoride (XeF_2)
Molecular Formula	XeF_2
Molecular Weight	169.29
Boiling Point	Not available.
Melting Point	~140°C
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Fluorination.
Availability	Not commercially available.
Preparation	J. L. Weeks, M. S. Matheson, *Inorg. Synth.*, 1966, **8**, 260-264.

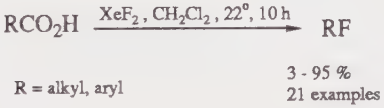
Fluorination of 1,3-dienes with xenon difluoride and (difluoroiodo)benzene

D. F. Shellhamer*, R. J. Conner, R. E. Richardson, V. L. Heasley, G. E. Heasley, *J. Org. Chem.*, 1984, **49**(*25*), 5015-5018



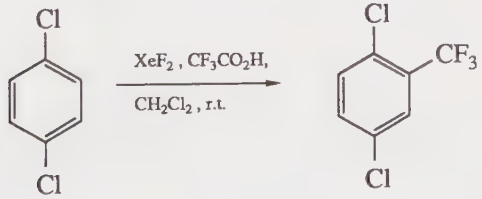
Replacement of the carboxylic acid function with fluorine

T. B. Patrick*, K. K. Johni, D. H. White, W. S. Bertrand, R. Mokhtar, M. R. Kilbourn, M. J. Welch, *Can. J. Chem.*, 1986, **64**(*1*), 138-141



Direct perfluoroalkylation of aromatic compounds using perfluorocarboxylic acids and xenon difluoride

Y. Tanabe, N. Matsuo*, N. Ohus, *J. Org. Chem.*, 1988, **53**(*19*), 4582-4585

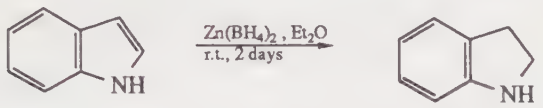


100. Zinc borohydride

CAS Registry Number	17611-70-0
CAS Name	Borate(1-), tetrahydro-, zinc (2:1)
Molecular Formula	$Zn(BH_4)_2$
Molecular Weight	95.06
Boiling Point	Not available.
Melting Point	Not available.
Density	Not available.
Refractive Index	Not available.
Safety and Handling	Not available.
Reactions	Reduction: *Chem. Pharm. Bull.*, 1984, **32**(*4*), 1411-1415.
Availability	Not commercially available.
Preparation	Prepared from $ZnCl_2$ and $NaBH_4$ in anhydrous ether: *J. Am. Chem. Soc.*, 1960, **82**, 6074.
Other Preparations	S. Kedrova, V. N. Konoplev, N. N. Mal'tseva, L. N. Tolmacheva, N. S. Kurnakov, *Otkrytiya Izobret., Prom. Obraztsy, Tovarnye Znaki*, 1975, **52**(*48*), 64; V. I. Mikheeva, N. N. Mal'tseva, N. S. Kedrova, *Zh. Neorg. Khim.*, 1979, **24**(2), 408-413.

Mild reduction of indoles to indolines with zinc borohydride

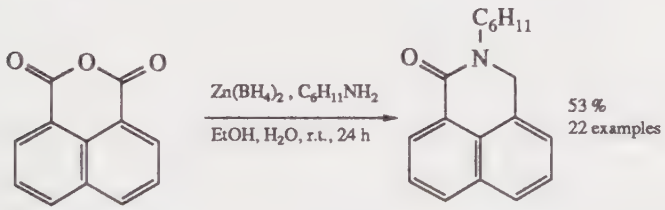
H. Kotsuki*, U. Ushio, M. Ochi, *Heterocycles*, 1987, **26**(*7*), 1771-1774



92 %
5 examples

New and convenient synthesis of dihydrobenzisoquinolinones using sodium or zinc borohydride

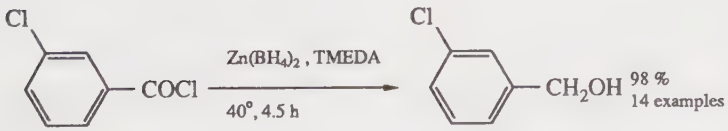
R. Sato*, K. Oikawa, T. Goto, M. Saito, *Bull. Chem. Soc. Jpn.*, 1988, **61**(*6*), 2238-2240



53 %
22 examples

Efficient reduction of acyl chlorides with zinc borohydride and tetramethylethylenediamine

H. Kotsuki*, Y. Ushio, N. Yoshimura, M. Ochi, *Bull. Chem. Soc. Jpn.*, 1988, **61**(*7*), 2684-2686



98 %
14 examples

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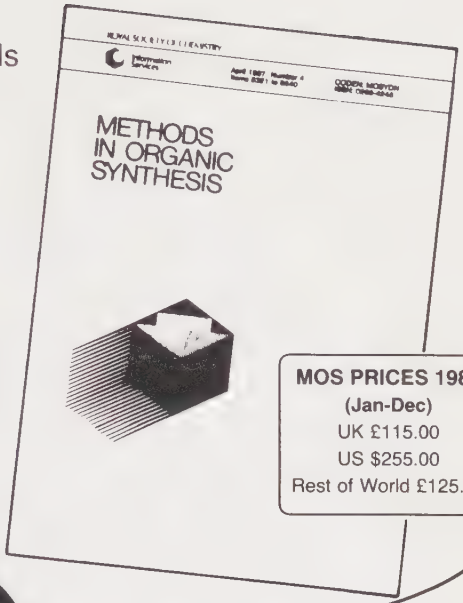

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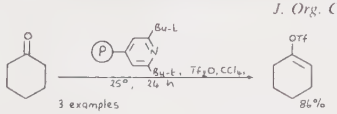

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