

Hawley's
Condensed Chemical
Dictionary

THIRTEENTH EDITION

Revised by
Richard J. Lewis, Sr.



VAN NOSTRAND REINHOLD

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potassium borofluoride. See potassium fluoroborate.

potassium borohydride.

CAS: 13762-51-1. KBH_4 .

Properties: White, crystalline powder. D 1.18, stable in moist and dry air, stable in vacuum to 500C, decomposed by acids with evolution of hydrogen. Partially soluble in water and ammonia; insoluble in ethers and hydrocarbons.

Derivation: By reaction of sodium borohydride and potassium hydroxide.

Grade: Technical, powder, pellets.

Hazard: Flammable, dangerous fire risk. Toxic by ingestion.

Use: Source of hydrogen; reducing agent for aldehydes, ketones, and acid chlorides; foaming agent for plastics.

potassium bromate.

CAS: 7758-01-2. KBrO_3 .

Properties: White crystals or crystalline powder. D 3.27, mp (decomposes) 370C, strong oxidizing agent. Soluble in boiling water.

Derivation: By passing bromine into a solution of potassium hydroxide.

Grade: Pure, CP, FCC.

Hazard: Dangerous fire risk in contact with organic materials, strong irritant.

Use: Laboratory reagent, oxidizing agent, permanent-wave compounds, maturing agent in flour, dough conditioner, food additive.

Note: Food additive uses restricted as to proportions used.

potassium bromide.

CAS: 7758-02-3. KBr .

Properties: White, crystalline granules or powder; pungent, strong, bitter, saline taste; somewhat hygroscopic. D 2.749, mp 730C, bp 1435C. Soluble in water and glycerol; slightly soluble in alcohol and ether.

Derivation: Solutions of iron bromide and potassium carbonate are mixed and heated, the solution filtered and concentrated, and the bromide crystallized out.

Grade: Technical, CP, NF, reagent, single crystals.

Hazard: Toxic by ingestion and inhalation.

Use: Photography (gelatin bromide papers and plates), process engraving and lithography, special soaps, spectroscopy, infrared transmission, laboratory reagent.

potassium-tert-butoxide.

See potassium-tert-butylate.

potassium-tert-butylate. (potassium-tert-butoxide) $(\text{C}_4\text{H}_9)_3\text{COK}$.

White, hygroscopic powder; a strong organic base.

Hazard: Flammable. May cause severe caustic tissue burns.

potassium carbonate. (potash; pearl ash).

CAS: 584-08-7. (1) K_2CO_3 . (2) $\text{K}_2\text{CO}_3 \cdot 1.5\text{H}_2\text{O}$.

39th-highest-volume chemical produced in the U.S. (1995).

Properties: White, deliquescent, granular, translucent powder; alkaline reaction. (1) D 2.428 (19C), mp 891C, bp decomposes. Soluble in water; insoluble in alcohol. Noncombustible.

Derivation: (1) Engel-Precht process uses magnesium oxide, potassium chloride, and carbon dioxide, separating the Engels salt ($\text{MgCO}_3 \cdot \text{KHCO}_3 \cdot 4\text{H}_2\text{O}$). Decomposition leaves potassium bicarbonate in solution, which can be processed to potassium carbonate. (2) Alkyl amines or ion-exchange resins can be used with potassium chloride and carbon dioxide to yield potassium bicarbonate, which is calcined to the carbonate. This is analogous to the Solvay process for sodium carbonate.

Grade: Crystals; technical; reagent; calcined 80–85%, 85–90%, 90–95%, 96–98%; hydrated 80–85%; FCC.

Hazard: Solutions irritating to tissue.

Use: Special glasses (optical and color TV tubes), potassium silicate, dehydrating agent, pigments, printing inks, laboratory reagent, soft soaps, raw wool washing, general-purpose food additive.

potassium chlorate.

CAS: 3811-04-9. KClO_3 .

Properties: Transparent, colorless crystals or white powder; cooling, saline taste. D 2.337, mp 368C, bp decomposes at 400C, giving off oxygen gas. Soluble in boiling water.

Derivation: (1) By electrolyzing a hot concentrated alkaline solution of potassium chloride. Preferably (2) by interaction of solutions of potassium chloride and sodium chlorate or calcium chlorate.

Hazard: Forms explosive mixture with combustible materials (sulfur, sugar, etc.); strong oxidizing agent.

Use: Oxidizing agent, explosives, matches, source of oxygen, textile printing, pyrotechnics, percussion caps, disinfectant, bleaching.

potassium chloraurate. See potassium gold chloride.

potassium chloride.

CAS: 7447-40-7. KCl .

Properties: Colorless or white crystals; strong saline taste. D 1.987, mp 772C. Soluble in water; slightly soluble in alcohol; insoluble in ether and acetone. Occurs naturally as sylvite. Noncombustible.

Derivation: (1) Mined from sylvite deposits in New Mexico and Saskatchewan, purified by fractional crystallization or flotation; (2) extracted from salt lake brines and purified by recrystallization.

Grade: Chemical (99.5 and 99.9%); agricultural grades sold as 60–62%, 48–52%, and 22% K_2O ; single crystals; USP; FCC.

Use: Intermediate, as a replacement for some natural materials.

trimethyladipic acid. $C_9H_{16}O_4$.

Properties: Powder. Combustible.

Use: Esterification agent for plasticizers, lubricants, alkyd resins, polyurethane, polyester, special polyamides; intermediate for the production of glycols.

trimethylaluminum. (aluminum trimethyl; ATM).

CAS: 75-24-1. $(CH_3)_3Al$.

Properties: Colorless, pyrophoric liquid. Bp 126C, mp 15.4C, d 0.752.

Derivation: By sodium reduction of dimethylaluminum chloride.

Hazard: Highly flammable; dangerous fire risk; flames instantly on contact with air; reacts violently with water, acids, halogens, alcohols, and amines.

Use: Catalyst for olefin polymerization, pyrophoric fuel, manufacture of straight-chain primary alcohols and olefins, to produce luminous trails in upper atmosphere to track rockets.

trimethylamine. (TMA).

CAS: 75-50-3. $(CH_3)_3N$.

Properties: Colorless gas at room temperature; fishy ammoniacal odor; readily liquefied. Anhydrous form shipped as liquefied compressed gas. D 0.6621 (-5C), bp -4C, fp -117.1C, autoign temp 374F (190C), flash p 10F (-12.2C) (CC), flash p (25% solution) 38F (3.3C) (TOC). Soluble in water, alcohol, and ether.

Derivation: Interaction of methanol and ammonia over a catalyst at high temperature. The mono-, di-, and trimethylamines are produced, and yields are regulated by conditions.

Method of purification: Azeotropic or extractive distillation.

Grade: Anhydrous 99% min, aqueous solution 25, 30, 40%.

Hazard: Flammable, dangerous fire risk, explosive limits in air 2-11.6%. Toxic by inhalation, vapor highly irritating. TLV: 10 ppm.

Use: Organic synthesis, especially of choline salts, warning agent for natural gas, manufacture of disinfectants, flotation agent, insect attractant, quaternary ammonium compounds, plastics.

trimethylamine sulfur trioxide. $(CH_3)_3N \cdot SO_3$.

Properties: White powder. Mp 232-238C (decomposes). Soluble in hot water, ethanol; soluble with difficulty in cold water and acetone; not dissociated in benzene and chloroform solutions; distinctly different from the isomeric adduct of trimethylamine oxide and sulfur dioxide.

Use: Separation of isomers, soil sterilant, catalyst for thermosetting resins.

2,4,5-trimethylaniline. See pseudocumidine.

trimethyl benzene.

CAS: 25551-13-7. $(CH_3)_3C_6H_3$.

Properties: Liquid. Mw 120.9. Insoluble in water.

Hazard: TLV: 25 ppm in air.

Use: Raw material for chemical synthesis.

1,2,3-trimethylbenzene. See hemimellitene.

1,2,4-trimethylbenzene. See pseudocumene.

1,3,5-trimethylbenzene. See mesitylene.

(trimethylbenzyl)dodecyldimethylammonium chloride. $[(CH_3)_3C_6H_2CH_2N(CH_3)_2C_{12}H_{25}]Cl$. A quaternary ammonium salt.

Properties: White to slightly yellow, crystalline powder; mild odor and taste. Mp 162-163C, bulk d 4.62 lb/gal. Soluble in water, alcohol, glycerol, acetone; pH of 10% solution in distilled water 4.4.

Use: Germicide.

trimethyl borate. (methyl borate; trimethoxyborine).

CAS: 121-43-7. $(CH_3O)_3B$.

Properties: Water-white liquid. Bp 67-68C, d 0.915, fp -29C, flash p 80F (26.6C). Miscible with ether, methanol, hexane, tetrahydrofuran; decomposes in presence of water.

Derivation: Reaction of boric acid and methanol.

Hazard: Flammable, fire risk, reacts with water and oxidizing agents.

Use: Solvent, dehydrating agent, fungicide for citrus fruit, neutron scintillation counters, brazing flux, boron compounds, catalyst.

2,2,3-trimethylbutane.

(isopropyltrimethylmethane; triptane).

$CH_3C(CH_3)_2C(CH_3)_3$.

Properties: Colorless liquid. D 0.691, bp 81.0C, fp -24.96C, refr index 1.3895 (20C). Soluble in alcohol; insoluble in water.

Hazard: Flammable, moderate fire risk.

Use: Organic synthesis, aviation fuel.

trimethyl carbinol. See *tert*-butyl alcohol.

1,1,3-trimethyl-5-carboxy-3-(*p*-carboxyphenyl)indane.

An aromatic di-acid used as an intermediate in the manufacture of polyester fibers, polyamides, and alkyd resins; hot-melt adhesives; engineering thermoplastics.

trimethylchlorosilane.

CAS: 75-77-4. $(CH_3)_3SiCl$.

Properties: Colorless liquid. Bp 57C, d 0.854 (25/25C), refr index 1.3893 (25C), flash p -18F (-27.7C). Readily hydrolyzed with liberation of hydrogen chloride; soluble in benzene, ether and perchloroethylene.

Derivation: By Grignard reaction of silicon tetrachloride and methylmagnesium chloride.

Hazard: Flammable, dangerous fire risk, reacts violently with water. Strong irritant to tissue.

Use: Intermediate for silicone fluids, as a chain-terminating agent, imparting water repellency.

trimethylcyclododecatriene. (TMCDT). A cyclic hydrocarbon.

Use: Intermediate in making derivatives useful in the perfume and pharmaceutical industries, as well as catalysts.

3,3,5-trimethylcyclohexanol-1.

CAS: 116-02-9. $C_9H_{18}(CH_3)_3OH$.

Properties: Colorless liquid. D 0.878 (40/20C), mp 35.7C, bp 198C, flash p 165F (73.9C) (OC). Soluble in most organic solvents, hydrocarbons, oils; insoluble in water. Combustible.

Hazard: Toxic by inhalation, strong irritant.

Use: Menthol and camphor substitute, antifoaming agent, hydraulic fluids and textile soaps, odor masking, esterification agent, pharmaceuticals, wax additive, printing inks.

3,5,5-trimethyl-2-cyclohexen-1-one. See isophorone.

3,3,5-trimethylcyclohexyl salicylate.

See homomenthyl salicylate.

trimethyl dihydroquinoline polymer.

(TDQP). $(C_{12}H_{15}N)_n$ (probably three or more quinoline groups).

Properties: Amber pellets. D 1.08, softening p 75C. Insoluble in water; miscible with ethanol, acetone, benzene, monochlorobenzene, isopropyl acetate, and gasoline.

Use: Antioxidant, stabilizer or polymerization inhibitor.

3,7,11-trimethyl-1,6,10-dodecatrien-3-ol.

See nerolidol.

3,7,11-trimethyl-2-6-10-dodecatrien-1-ol.

See farnesol.

trimethylene. See cyclopropane.

trimethylene bromide. (1,3-dibromopropane).

CAS: 109-64-8. $CH_2BrCH_2CH_2Br$.

Properties: Colorless liquid; sweet odor. D 1.979 (20/4C), bp 166C, fp -34.4C. Insoluble in water; soluble in organic solvents. Combustible.

Grade: Technical, CP.

Use: Intermediate for dyestuff and pharmaceutical industries, cyclopropane manufacture.

trimethylene chlorobromide. See 1-bromo-3-chloropropane.

trimethylene chlorohydrin. (3-chloro-1-propanol). $ClCH_2CH_2CH_2OH$.

Properties: Colorless to pale-yellow liquid; characteristic odor. D 1.130-1.150 (25/25C), refr index 1.445-1.447 (25C). Soluble in water, alcohols, and ethers; insoluble in hydrocarbons. Combustible.

Use: Intermediate.

trimethylenedicyanide. See glutaronitrile.

trimethylene glycol. (1,3-propylene glycol; 1,3-propanediol).

CAS: 504-63-2. $CH_2OHCH_2CH_2OH$.

Properties: Colorless liquid; odorless. D 1.0537 (25C), bp 210-211C, autoign temp 752F (400C). Soluble in water, alcohol, and ether. Combustible.

Derivation: From acrolein.

Grade: Technical 95%, pure 99%.

Use: Intermediate, especially for polyesters.

trimethylene oxide. See oxetane.

sym-trimethylene trinitramine.

See cyclonite.

trimethylethylene. See 3-methyl-2-butene.

trimethylglycine. See betaine.

trimethylheptanoic acid. See isodecanoic acid.

2,2,5-trimethylhexane.

$(CH_3)_3CCH_2CH_2CH(CH_3)_2$.

Properties: Colorless liquid. Fp -105.84C, bp 124.06C, d 0.711 (15.5/15.5C), refr index 1.399 (20C), flash p 55F (12.7C).

Grade: 95%, 99%; research.

Hazard: Flammable, dangerous fire risk; the 2,3,3-, 2,3,4-, and 3,3,4-isomers are less flammable.

Use: Synthesis, motor-fuel additive.

3,5,5-trimethylhexan-1-ol. $C_9H_{20}O$.

Properties: Colorless liquid; mild odor. Bp 194C, d 0.8236 (25/4C), bulk d 6.86 lb/gal (25C), refr index 1.4300 (25C), flash p 200F (93.3C) (OC). Insoluble in water. Combustible.

Derivation: High-pressure synthesis.

Use: Synthetic lubricants, additives to lubricating oils, wetting agent, softener in manufacture of various plastics, disinfectants and germicides.

trimethylmethane. See isobutane.

trimethyl nitrilotripropionate.

$N(CH_2CH_2COOCH_3)_3$.

Properties: Weakly basic tertiary amine and organic ester.

Use: Plasticizer for PVC, intermediate for pharmaceutical and agricultural chemicals, high-boiling solvents, low-temperature lubricants.

trimethylnonanol. See 2,6,8-trimethylnonyl-4 alcohol.