

Methyl ethyl ketone may be implicated in volatile substance abuse (p.2019).

References.

- WHO. Methyl ethyl ketone. *Environmental Health Criteria* 143. Geneva: WHO, 1992. Available at: <http://www.inchem.org/documents/ehc/ehc/ehc143.htm> (accessed 30/06/04)

Effects on the nervous system. There are isolated reports of neurotoxicity produced by methyl ethyl ketone alone.¹ These include 1 of retrobulbar neuritis and 1 of peripheral neuropathy. It has been suggested, however, that methyl ethyl ketone potentiates the peripheral neuropathy induced by methyl butyl ketone and *n*-hexane.

For further discussion of neurotoxicity after occupational exposure to solvents including methyl ethyl ketone, see under Toluene, p.2026.

- Lolin Y. Chronic neurological toxicity associated with exposure to volatile substances. *Hum Toxicol* 1989; **8**: 293–300.

Uses

Methyl ethyl ketone is used as an industrial solvent and as an extraction solvent in food processing.

Octyldodecanol

Octyldodecanol; Octyldodécanol; Octyldodecanolum; Oktildodekanol; Oktildodekanolis; Oktyldodekanol; Oktylododekanoli; Oktylyldodekanoli.

Октилдодеканол
C₂₀H₄₂O = 298.5.

Pharmacopoeias. In *Eur.* (see p.vii). Also in *USNF*.

Ph. Eur. 6.2 (Octyldodecanol). A condensation product of saturated liquid fatty alcohols. It contains not less than 90% of (*RS*)-2-octyldodecan-1-ol, the remainder consisting mainly of related alcohols. A clear, colourless to yellowish, oily liquid. Relative density 0.830 to 0.850. Practically insoluble in water; miscible with alcohol. Protect from light.

USNF 26 (Octyldodecanol). It contains not less than 90% of 2-octyldodecanol, the remainder consisting chiefly of related alcohols. A clear, water-white, free-flowing liquid. Insoluble in water; soluble in alcohol and in ether. Store in airtight containers.

Profile

Octyldodecanol is used as a pharmaceutical solvent.

Pentane

Amyl Hydride; Pentan; *n*-Pentane.

Пентан
C₅H₁₂ = 72.15.
CAS — 109-66-0.

Profile

Pentane is used as a solvent and as a fuel. It is highly volatile and has also been used topically for its cooling effects.

References.

- McKee R, et al. Toxicology of *n*-pentane (CAS no. 109-66-0). *J Appl Toxicol* 1998; **18**: 431–42.

Petroleum Spirit

Benzyna; Éter de pétroleo; Light Petroleum; Petroleum Benzin; Petroleum Ether; Solvent Hexane.

Бензин; Петролейный Эфир

Description. Petroleum spirit is a purified distillate of petroleum, consisting of a mixture of the lower members of the paraffin series of hydrocarbons. It is a colourless, transparent, very volatile, highly flammable liquid with a characteristic odour. It is available in a variety of boiling ranges.

Pharmacopoeias. In *Ger.*, *Jpn.*, and *Pol.* Various boiling ranges are specified.

Swiss describes Benzinum Medicinale, consisting mainly of hexane and heptane.

NOTE. The motor fuel termed 'petrol' in the UK and 'gasoline' in the USA is a mixture of volatile hydrocarbons of variable composition containing paraffins (alkanes), olefins (alkenes), cycloparaffins, and aromatic compounds.

Adverse Effects and Treatment

As for Kerosene, p.2024. Petroleum spirit and petrol, being more volatile and of lower viscosity than kerosene, are more likely to be inhaled and to cause aspiration pneumonitis. The toxicity of petrol varies with its composition; some adverse effects have been attributed to lead additives or to the content of *n*-hexane or benzene. Petrol may be implicated in volatile solvent abuse (p.2019).

References to the toxicity of petroleum spirit.¹⁻³

For discussion of neurotoxicity after occupational exposure to solvents including petrol, see under Toluene, p.2026.

- WHO. Selected petroleum products. *Environmental Health Criteria* 20. Geneva: WHO, 1982. Available at: <http://www.inchem.org/documents/ehc/ehc/ehc020.htm> (accessed 30/06/04)

- Daniels AM, Latham RW. Petrol sniffing and schizophrenia in a Pacific island paradise. *Lancet* 1984; **i**: 389.
- Eastwell HD. Elevated lead levels in petrol "sniffers". *Med J Aust* 1985; **143** (suppl): S63–4.

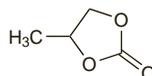
Uses

Petroleum spirit and other petroleum distillates are used as pharmaceutical solvents.

Propylene Carbonate

Carbonato de propileno. 4-Methyl-1,3-dioxolan-2-one.

Пропиленкарбонат
C₄H₆O₃ = 102.1.
CAS — 108-32-7.



Description. Propylene carbonate is a clear colourless mobile liquid. Freely soluble in water; miscible with alcohol and with chloroform; practically insoluble in petroleum spirit.

Pharmacopoeias. In *USNF*.

USNF 26 (Propylene Carbonate). Sp. gr. 1.203 to 1.210 at 20°. Store in airtight containers.

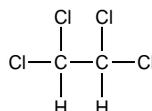
Profile

Propylene carbonate is used as a solvent in oral and topical pharmaceuticals and for cellulose-based polymers and plasticisers. It has been used as a nonvolatile, stabilising liquid carrier in hard gelatin capsules.

Tetrachloroethane

Acetylene Tetrachloride; Tetrachloroetan; Tetrachloroetano. 1,1,2,2-Tetrachloroethane.

Тетрахлорэтан
C₂H₂Cl₄ = 167.8.
CAS — 79-34-5.



Description. Tetrachloroethane is a colourless liquid with a chloroform-like odour. B.p. about 146°. Wt per mL about 1.59 g. Store in airtight containers.

Adverse Effects and Treatment

As for Carbon Tetrachloride, p.2021. Tetrachloroethane is probably the most toxic of the chlorinated hydrocarbons. Poisoning can occur through percutaneous absorption as well as after ingestion or inhalation.

Handling. Suitable precautions should be taken to avoid skin contact with tetrachloroethane as it can penetrate skin and produce systemic toxicity.

Uses

Tetrachloroethane is used as an industrial solvent.

Tetrachloroethylene

Perchloroethylene; Tetrachloroethene; Tetrachloroethylenum; Tetracloroetileno.

Тетрахлорэтилен
C₂Cl₄ = 165.8.
CAS — 127-18-4.



Adverse Effects and Treatment

As for Carbon Tetrachloride, p.2021. Symptoms, especially after ingestion, are less severe with tetrachloroethylene than with carbon tetrachloride.

The vapour or liquid may be irritating to skin or mucous membranes.

Tetrachloroethylene may be implicated in volatile substance abuse (p.2019). Dependence may follow habitual inhalation of small quantities of tetrachloroethylene vapour.

References to adverse effects of tetrachloroethylene.

- Bagnell PC, Ellenberger HA. Obstructive jaundice due to a chlorinated hydrocarbon in breast milk. *Can Med Assoc J* 1977; **117**: 1047–8.

- WHO. Tetrachloroethylene. *Environmental Health Criteria* 31. Geneva: WHO, 1984. Available at: <http://www.inchem.org/documents/ehc/ehc/ehc31.htm> (accessed 30/06/04)
- WHO. Tetrachloroethylene health and safety guide. *IPCS Health and Safety Guide* 10. Geneva: WHO, 1987. Available at: <http://www.inchem.org/documents/hsg/hsg/hsg010.htm> (accessed 30/06/04)
- Health and Safety Executive. Tetrachloroethylene (tetrachloroethene, perchloroethylene). *Toxicity Review* 17. London: HMSO, 1987.
- Mutti A, et al. Nephropathies and exposure to perchloroethylene in dry-cleaners. *Lancet* 1992; **340**: 189–93.

Pharmacokinetics

Tetrachloroethylene is slightly absorbed from the gastrointestinal tract; absorption is increased in the presence of alcohol and fats or oils. It is absorbed after inhalation and after direct contact with the skin. It is excreted unchanged in expired air; initial elimination is rapid but a proportion may be retained and excreted slowly.

Metabolites of tetrachloroethylene, mainly trichloroacetic acid, have been found in the urine.

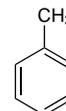
Uses and Administration

Tetrachloroethylene is a chlorinated hydrocarbon widely used as a solvent in industry. It was formerly given orally as an anthelmintic, but has been superseded by equally effective and less toxic drugs.

Toluene

Methylbenzene; Phenylmethane; Toluen; Tolueno; Toluol; Toluole.

Толуол
C₇H₈ = 92.14.
CAS — 108-88-3.



NOTE. The following terms have been used as 'street names' (see p.vi) or slang names for various forms of toluene: Tolley; Tolly; Tooley.

Description. Toluene is a colourless, volatile, flammable liquid with a characteristic odour. Wt per mL about 0.87 g. B.p. about 111°. Store in airtight containers.

Adverse Effects, Treatment, and Precautions

Toluene has similar acute toxicity to benzene (p.2020) but is a less serious industrial hazard. Adverse effects are treated similarly to benzene. It is a common constituent of adhesives and is frequently implicated in volatile substance abuse (p.2019). Commercial toluene may contain benzene, and this may perhaps influence the pattern of adverse effects. In addition to acute toxic effects, toluene abuse has been associated with damage to the nervous system, kidneys, liver, heart, and lungs (see below). Chronic poisoning caused by occupational exposure to toluene has resulted mainly in nervous system disorders.

References.

- WHO. Recommended health-based limits in occupational exposure to selected organic solvents. *WHO Tech Rep Ser* 664 1981. Available at: http://libdoc.who.int/trs/WHO_TRS_664.pdf (accessed 03/09/08)
- WHO. Toluene. *Environmental Health Criteria* 52. Geneva: WHO, 1985. Available at: <http://www.inchem.org/documents/ehc/ehc/ehc52.htm> (accessed 30/06/04)
- Health and Safety Executive. Toluene. *Toxicity Review* 20. London: HMSO, 1989.

NOTE. The non-neurological toxicity after volatile substance abuse has been reviewed.¹ Chronic toluene abuse may result in damage to the kidneys; renal tubular acidosis and glomerulonephritis have been described, although evidence for the latter is only circumstantial. Renal tubular acidosis has been regarded as reversible; however, there are reports suggesting that damage to renal tubules is permanent.

The few reports linking chronic toluene abuse with liver damage cover hepatomegaly and hepatorenal failure. Effects on the heart are usually acute; sudden death has resulted from ventricular arrhythmias. Chronic myocarditis with fibrosis has been reported. Chronic toluene inhalation can cause damage to the lungs. Autopsies in a few patients have shown changes indicative of emphysema.

Nervous system toxicity has also been reviewed.^{2,3} Cerebellar dysfunction has occurred after toluene abuse; an acute intoxication phase, which usually subsides within weeks of abstinence, is followed by a chronic phase which may be permanent. Diffuse CNS disease such as encephalopathy, dementia, and multifocal brain injury may also develop. An association between toluene abuse and peripheral neuropathy has not been confirmed; muscle weakness may be a result of electrolyte and fluid disturbances. Choreoathetosis, epilepsy, and optic atrophy with anosmia and deafness have been reported after toluene abuse. Some of these neurological effects, particularly cerebellar effects and diffuse