

2,2,2-Trifluoroethanol (TFE)

2,2,2-Trifluoroethanol is a colourless liquid which is fully miscible with water. Because of the high electronegativity of the fluorine atoms 2,2,2-trifluoroethanol has a stronger acid character than ethanol. Due to this there is a stronger tendency to form hydrogen bridging and this makes possible the production of more stable complexes with heterocycles such as THF and pyridine. By oxidation 2,2,2-trifluoroethanol is converted to trifluoroacetaldehyde or trifluoroacetic acid.

Physical Properties

Chemical name:	2,2,2-Trifluoroethanol
CAS-No.:	75-89-8
Chemical formula	CF₃CH₂OH
Molecular formula:	C ₂ H ₃ F ₃ O
Molecular weight:	100.04
Boilingpoint:	+ 73.6 °C
Melting point:	- 43.5 °C
Density (25 °C):	1.383 g/cm ³
n _D ²⁰ :	1.2940
Flash point:	33 °C
Combustion enthalpy:	- 886.6 kJ/mol
Evaporation enthalpy:	37.8 kJ/mol
Thermal stability:	up to 315 °

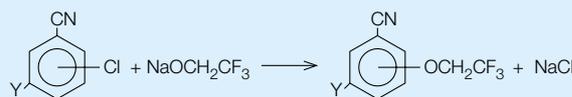
Specification

Purity:	min. 99.9 %
Sulphate:	max. 0.001 %
Water:	max. 0.05 %
Fluoride:	max. 0.001 %
Chloride:	max. 0.001 %

Chemical Reactions and Applications

2,2,2-Trifluoroethanol is a typical alcohol and is used as an intermediate in chemical synthesis. The addition of acetylene or tetrafluoroethylene leads to the formation of the products 1,1,2,2-tetrafluoroethyl-2',2',2'-trifluoroethyl ether and 2,2,2-Trifluorovinyl-ether. Trifluoroethoxylated aromatics and heterocycles are produced directly by the conversion of NaOCH₂CF₃ (from NaH and CF₃CH₂OH) with activated chlorobenzenes or chloroheterocycles.

NaOCH₂CF₃ must not be isolated because it is explosive.



Because of its high ionization energy and low specific conductivity, 2,2,2-trifluoroethanol is additionally used as a solvent for ionic reactions and conductometric titrations. 2,2,2-trifluoroethanol has a further application as a solvent for polymers with nucleophilic substituents like polyamides (nylon), polyformaldehyde and polyacryl nitriles.

The good combination of physical and thermodynamic properties leads to the use of 2,2,2-trifluoroethanol as a working fluid for heat-absorption pumps and heat absorption transformers. 2,2,2-trifluoroethanol is used with absorption agents such as quinoline, tetraethylene glycol or N-methyl pyrrolidon. To improve local percutaneous absorption, 2,2,2-trifluoroethanol may be used in addition to 2,2,2-trichloroethanol in pharmaceutical products such as sympathomimetics, local anaesthetics and steroids. The mixture trifluoroethanol/water (e.g. 85/15) serves as a medium in heat recovery processes (Rankine-cycle-processes).

Delivery and Handling

2,2,2-Trifluoroethanol is supplied in polyethylene-lined metal drums. Inhalation and skin contact are to be avoided. Trifluoroethanol is inflammable and has a flash point of 33 °C. Furthermore, contact with the eyes is to be avoided at all costs. According to the latest experiments, it must be assumed that 2,2,2-Trifluoroethanol is a strong eye irritant which can cause irreparable damage. Below a concentration of 10 ppm no significant harmful effects have been recorded.

Toxicological Data

IRDS: skn-rbt 50 mg/24H SEV	28ZPAK -78,72*
eye-rbt 20 mg/24H SEV	28ZPAK -78,72*
TXDS: orl-rat LDLo:2000 mg/kg	29ZPAK -78,72*
orl-mus LD50: 366 mg/kg	TXAPA9 15,83,69**
ihl-mus LC50: 1,6 %/10 M	RTECS 81/82
ipr-mus LD50: 195 mg/kg	APTOA6 28,299,70***
ivn-dog LDLo: 400 mg/kg	TXAPA9 15,83,69**

Lit: ** TXAPA9: Toxicology and Applied Pharmacology. (Academic Press, 111 5th Ave., New York, NY 10003) V.1

* 28 ZPAK: Sbornik Vysledku Toxikologickeho Vysetreni Latek A Pripravku, J. V. Marhold, Institut Pro Vychovu Vedoucicn Pracovniku Chemickeho Prumyclu Praha, Czechoslovakia, 1972

*** APTOA6: Acta Pharmacologica et Toxicologica. (Munksgaard, 35 Norre Sogade, DK 1370 Copenhagen, K. Denmark) V.1, 1945

Availability t-lots

HS. Code No. 290550 20

Solvay
Fluor und Derivate

