

SIDS INITIAL ASSESSMENT PROFILE

CAS N°.	75-68-3
CHEMICAL NAME	1-chloro-1,1-difluoroethane
Structural formula	Cl F ₂ C - C H ₃
RECOMMENDATIONS	
<p>The chemical is currently of low priority for further work as it is subject to withdrawal under international activity (Montreal protocol)</p>	
SUMMARY CONCLUSIONS OF THE SIARS	
Human Health	
<p>1-chloro-1,1-difluoroethane is a colourless gas with slight ethereal odour:</p> <p>Acute toxicity of 1-chloro-1,1-difluoroethane is low (LC₅₀/6h >1,640,000 mg/m³ (400,000ppm) in rats). Inhalation of high concentrations induced signs of lung irritation and Central Nervous System depressing effects of anesthetic type in rats and cardiac sensitisation in dogs. Consequently, 1-chloro 1,1-difluoroethane may be hazardous to humans in case of accidental exposure to high concentrations occurring in confined area where replacement of air by the gas could at the same time reduce oxygen in the atmosphere. In repeated inhalation exposure studies, 1-chloro-1,1-difluoroethane did not induce specific chronic toxicity in rats and dogs exposed 6 h/d, 5 d/week during several months (no target organs identified ; the no observed adverse effects were higher than 41 000 mg/m³ (10,000ppm) in dogs exposed during 3 months and higher than 82 000mg/m³ (20,000ppm) in rats exposed for their lifetime). There was no carcinogenic effect in rats exposed for their life time (6h/d, 5d/week at concentrations up to 82 000 mg/m³(20,000ppm)). In genotoxicity studies, 1-chloro-1,1-difluoroethane was mutagenic <i>in vitro</i> on bacteria (Ames test) and gave equivocal results in a cell neoplastic transformation assay. However, in <i>in vivo mutagenicity</i> studies it was inactive (in a Dominant lethal assay and in a Bone Marrow cytogenetic assay in rats exposed by inhalation during 15 and 13 weeks respectively). Overall, these results suggest that 1-chloro-1,1- difluoroethane does not pose a significant genotoxic hazard to humans. In the reproduction field, 1-chloro 1,1-difluoroethane did not induce adverse effect on fertility of male mice exposed up to 82 000 mg/m³(20,000ppm) (in a Dominant lethal assay) and did not induce male and female lesions of sexual organs in rats and dogs exposed for several months. Also the gas did not induce teratogenic or embryo/foetotoxicity effect and no maternal toxicity in two inhalation developmental toxicity studies where rats were exposed during pregnancy up to 41000 mg/m³ (10,000ppm).</p>	

Environment

Based on its physico-chemical properties, the air compartment is the preferred target one for 1-chloro-1,1-difluoroethane. The global atmospheric lifetime of 142b is 18.5 years corresponding to a 1/2-lifetime of 12.8 years. The tropospheric lifetime due to removal by reaction with OH is 19.5 years.

Atmospheric degradation products are essentially the aldehyde form of 142b which further degrades to form $\text{CF}_2(=\text{O})$ which will hydrolyse in atmospheric water to form HF (also in the OECD HPV chemicals programme) and CO_2 .

The ozone depletion potential (ODP) of 1-chloro-1,1-difluoroethane is the main concern of this substance. Due to its ODP value of 0.065, it is considered as an ozone depleting substance.

The calculated Global Warming Potential of 1-chloro-1,1-difluoroethane is 1800 (IPCC 1995) for an integration horizon of 100 years. Its contribution to the Greenhouse effect is small i.e. 0.00108 W/m^2 from IPCC 1995 data.

In water, 1-chloro-1,1-difluoroethane is not readily biodegradable under aerobic condition (about 5 % of biodegradation after 28 days). It is not expected to bioaccumulate ($\log K_{ow} = 1.64 - 2.05$).

1-chloro-1,1-difluoroethane has a low acute toxicity to fish and daphnia. The lowest available LC 50 being higher than 100mg/liter. No acute toxicity tests are available for algae. Algae appear to be more sensitive than fish and daphnids to 1-chloro-1,1-difluoroethane with a calculated 96h EC50 of 45mg/l.

From these results, a PNEC of 45 $\mu\text{g/l}$ is proposed applying a factor of 1000 to the lowest figure obtained from the QSAR for algae (45 mg/l).

Exposure

The expected production volume of 1-chloro-1,1-difluoroethane in year 2000 is 36,000 tonnes in Europe, 42,000 tonnes in the USA and an amount of 84,000 tonnes for the total world. Its main uses are as a chemical intermediate to produce fluoropolymers and as a blowing agent. A small portion is used as a component of refrigerant fluids.

Because of its ODP, the production and consumption of 1-chloro-1,1-difluoroethane are covered by the Montreal Protocol. In the case of developed countries, a phase-out of 1-chloro-1,1-difluoroethane and other hydrochlorofluorocarbons (HCFCs) is scheduled as follows : 35% in 2004, 65% in 2010, 90% in 2015, 99.5% in 2020. A total phase-out is scheduled in 2030. For developing countries, a freeze of the production is scheduled in 2016 and a total phase-out in 2040.

In the European Union, the phase-out of ozone depleting substances is scheduled more rapidly than that required by the Montreal protocol. The total ban of hydrochlorofluorocarbons (HCFCs) is required on January 1, 2010 the use as blowing agent for expanded polystyrene being prohibited from January 1, 2002.

NATURE OF FURTHER WORK RECOMMENDED

None recommended.

Due to be phased out under the Montréal protocol