

2-Chloro-1,1,1-trifluoroethane

2-Chloro-1,1,1-trifluoroethane (FC133a) is a low molecular weight halogenated hydrocarbon. It is an intermediate in the synthesis of halothane, a commonly used general anesthetic. It is present as a contaminant in halothane, and is a volatile metabolite of halothane. Exposure is likely to occur to workers engaged in the production of halothane, to health care workers in areas where halothane is used, and to patients administered halothane as an anesthetic.

2-Chloro-1,1,1-trifluoroethane passed the animal data screen, underwent a preliminary toxicological evaluation, and is being brought to the Carcinogen Identification Committee for consultation. This is a compilation of the relevant data identified during the preliminary toxicological evaluation.

Epidemiological data

No cancer epidemiology studies were identified.

Animal carcinogenicity studies

- Long-term gavage studies in rats
 - Studies in male and female SPF Alpk/Ap (Wistar-derived) rats: Longstaff *et al.* (1984)

Other relevant data

- Genotoxicity
 - Mutation assays in *Salmonella*: Reviewed in IARC (1986, 1999).
 - *In vivo* chromosomal aberration assay in rat bone marrow: Reviewed in IARC (1999).
 - Dominant lethal mutation assays in male mice: Reviewed in IARC (1999).
- Structure activity considerations
 - Other low molecular weight halogenated hydrocarbons that are Proposition 65 carcinogens include: bromodichloromethane, bromoethane, chloroethane, 1,2-dibromoethane (ethylene dibromide), 1,1-dichloroethane, 1,2-dichloroethane (ethylene dichloride), dichloromethane, hexachloroethane, 1,1,2,2-tetrachloroethane, and 1,2,3-trichloropropane.
 - Several of these Proposition 65 carcinogens caused tumors at estrogen-responsive sites:
 - Chloroethane induced a high incidence of uterine carcinomas of endometrial origin in mice (control, 0/49; exposed, 43/50): NTP (1989a).
 - Bromoethane induced squamous cell carcinomas of the uterus in mice: NTP (1989b).

- 1,1-Dichloroethane induced uterine tumors in mice, and mammary tumors in female rats: NTP (1978a)
- 1,2-Dichloroethane induced uterine tumors in mice and mammary tumors in female rats and mice: NTP (1978b)
- 1,2,3-Trichloropropane induced uterine tumors in mice and mammary tumors in female rats: NTP (1993)
- 1,2-Dibromoethane induced mammary tumors in female rats and mice: NTP (1982)
- Metabolism
 - Metabolic dehalogenation of 2-chloro-1,1,1-trifluoroethane is expected to be similar to chloroethane and bromoethane (Salmon *et al.*, 1981; 1985).

Reviews

- IARC (1986, 1999)

References¹

International Agency for Research on Cancer (IARC, 1986). Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, Volume 41, Some Halogenated Hydrocarbons and Pesticide Exposures. Lyon, France.

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National Toxicology Program (NTP, 1978a). *Bioassay of 1,1-Dichloroethane for Possible Carcinogenicity (CAS No. 75-34-3)*. Technical Report No. 66. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health.

National Toxicology Program (NTP, 1978b). *Bioassay of 1,2-Dichloroethane for Possible Carcinogenicity (CAS No. 107-06-2)*, Technical Report No. 55. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health.

National Toxicology Program (NTP, 1982). *Carcinogenesis Bioassay of 1,2-Dibromoethane (CAS No. 106-93-4) in F344 Rats and B6C3F1 Mice (Inhalation Study)*.

¹ Copies of these listed references, as either the abstract, the relevant sections of the publication, or the complete publication, have been provided to members of the Carcinogen Identification Committee. These references have been provided in the order in which they are discussed in this document.

Technical Report No. 210. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health.

National Toxicology Program (NTP, 1989a). *Toxicology and Carcinogenesis Studies of Chloroethane (Ethyl Chloride) (CAS No. 75-00-3) in F344/N Rats and B6C3F1 Mice (Inhalation Studies)*. Technical Report No. 346. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health.

National Toxicology Program (NTP, 1989b). *Toxicology and Carcinogenesis Studies of Bromoethane (Ethyl Bromide) (CAS No. 74-96-4) in F344/N Rats and B6C3F1 Mice (Inhalation Studies)*. NTP Technical Report No. 363. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, Research Triangle Park, NC.

National Toxicology Program (NTP, 1993). *Toxicology and Carcinogenesis of 1,2,3-Trichloropropane (CAS No. 96-18-4) in F344/N Rats and B6C3F1 Mice (Gavage Studies)*. NTP Technical Report No. 384. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, Research Triangle Park, NC.

Salmon AG, Jones RB, Mackrodt WC (1981). Microsomal dechlorination of chloroethanes: Structure-reactivity relationships. *Xenobiotica* 11:723-734.

Salmon AG, Nash JA, Walklin CM, Freedman RB (1985). Dechlorination of halocarbons by microsomes and vesicular reconstituted cytochrome P-450 systems under reductive conditions. *Brit J Ind Med* 42:305-311.