Vinylidene Chloride

Vinylidene chloride (1,1-dichloroethylene) is used extensively as a monomeric intermediate in the production of polymers and fibers. These include polyvinylidene chloride resins, modacrylic fibers, and films for food packaging. Exposure is expected to workers involved in the manufacture of the monomer and polymers and in the processing of polymers and fibers. It is unclear whether there is any exposure to the general population.

Vinylidene chloride 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 studies identified during the preliminary toxicological evaluation.

Epidemiological data

- Cohort studies
  - Occupational study: Ott *et al*. (1976)
  - Reviews: Apfeldorf and Infante (1981)

Animal carcinogenicity data

- Long-term inhalation studies in mice
  - Male and female Swiss mice (52-week treatment period, and then observed up to week 121): Maltoni *et al*. (1984, see Tables 2, 23-25, and Appendix)
  - 12-month studies in male and female CD-1 mice: Lee *et al*. (1977, 1978), as described by IARC (1986)

- Long-term inhalation studies in rats
  - Male and female Sprague-Dawley rats (52-week treatment period, and then observed up to week 137): Cotti *et al.* (1988), Maltoni *et al.* (1984, see Tables 8-12)
  - 18-month studies in male and female Sprague-Dawley rats: Quast *et a*l. (1986)
  - 12-month studies in male and female CD rats: Lee *et al*. (1977, 1978), as described by IARC (1986)

- Long-term inhalation studies in hamsters
  - Male and female Chinese hamsters (52-week treatment period, and then observed up to week 164): Maltoni *et al.* (1984, see Tables 5, 26)
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- Long-term gavage studies in mice
  - Two-year gavage studies in male and female $B6C3F_1$ mice: NTP (1982)

- Long term-gavage studies in rats
  - Two-year gavage studies in male and female F344/N rats: NTP (1982)

- Male and female Sprague-Dawley rats (High and low dose studies with a 52-week treatment period, and then observed up to week 147): Maltoni *et al.* (1984, see Tables 3-4, 13-22)
- Male and female BDIV rats (one dose on gestation day 17 + weekly dosing from weaning to natural death): Ponomarkov and Tomatis (1980), as described by IARC (1986)

- Chronic drinking water studies in rats
  - Two-year drinking water studies in male and female Sprague-Dawley rats: Quast *et al.* (1983)

- Subcutaneous studies in mice
  - Female Ha:ICR Swiss mice (once per week for 78 weeks): Van Duuren *et al*. (1979), as described by IARC (1986)

- Dermal studies in mice
  - Female Ha:ICR Swiss mice (three times per week for up to 84 weeks): Van Duuren *et al*. (1979), as described by IARC (1986)

- Tumor initiation study
  - Female Ha:ICR Swiss mice (single dermal application, followed two weeks later with thrice-weekly applications of 12-0-tetradecanoylphorbol 13-acetate for up to 82 weeks): Van Duuren *et al*. (1979), as described by IARC (1986)
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Other relevant data

- Genotoxicity data
  - *Salmonella* mutagenicity assay: reviewed in IARC (1986, pp. 211-212)
  - *E. coli* mutagenicity assay: *ibid*
  - *Saccharomyces* point mutation assay: *ibid*
  - Chinese hamster V79 mutation assay: *ibid*
  - Chinese hamster assay for chromosomal aberrations: *ibid*
  - Assays for DNA binding and unscheduled DNA synthesis in CD-1 mice: *ibid*
  - Dominant lethal mutation assay in CD-1 mice: *ibid*

- Structure activity considerations
  - Structurally similar to the Proposition 65 carcinogens vinyl chloride and vinyl bromide.
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Review

- IARC (1986)

References[1]

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Cotti G, Maltoni C, LeFemine G (1988). Long-term carcinogenicity bioassay on vinylidene chloride administered by inhalation to Sprague-Dawley rats. *Ann NY Acad Sci* **534**:160-168.

International Agency for Research on Cancer (IARC, 1986). *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Some Chemicals Used in Plastics and Elastomers* Vol. 39, IARC, World Health Organization, Lyon, France.

Maltoni C, Cotti G, Chieco P (1984). Chronic toxicity and carcinogenicity bioassays of vinylidene chloride. *Acta Oncol* **5**(2):91-145.

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Ott MG, Fishbeck WA, Townsend JC, Schneider EJ (1976). A health study of employees exposed to vinylidene chloride. *J Occup Med* **18:**735-738.

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Quast JF, McKenna MJ, Rampy LW, Norris JM (1986). Chronic toxicity and oncogenicity study on inhaled vinylidene chloride in rats. *Fund Appl Toxicol* **6**:105-144.

[11] 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.