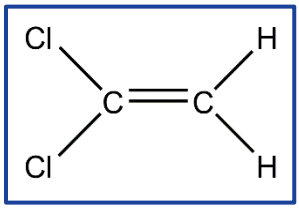
SUMMARY

Background: Vinylidene chloride is used to produce a range of polymers (i.e., chemical compounds that comprise repeating molecular structural units), including films for food containers and coatings for products ranging from carpets and tape to railroad containers. Humans are primarily exposed to vinylidene chloride by inhaling contaminated air or drinking contaminated water. The compound is an irritant and a central nervous system depressant in humans and has been reported to induce toxicity in the liver, lung, and kidney. The effects of inhalation exposure to vinylidene chloride in male and female rats and mice were studied to identify potential toxicity or cancer-related outcomes.



Methods: Groups of 50 male and 50 female rats were exposed to air containing vapors of vinylidene chloride at concentrations of 25, 50, or 100 parts per million (ppm) for 6 hours per day, 5 days per week, for 2 years. Groups of mice were similarly exposed to atmospheres containing 6.25, 12.5, or 25 ppm of vinylidene chloride. Control animals were exposed to clean air in the same type of inhalation chambers (0 ppm vinylidene chloride). Additional 2-week and 3-month studies were conducted to set appropriate doses and identify target organs for subsequent studies. The animals were monitored for illness or mortality and body weight changes throughout the studies. Tests were conducted to evaluate the potential for vinylidene chloride to cause DNA damage. At the end of the study, tissues from more than 40 sites from every animal were examined for signs of disease.

Results: Survival was decreased in female rats and male and female mice exposed to vinylidene chloride. In male and female mice, body weights were decreased, and thinness and abnormal breathing were observed. Additionally, female mice had front torso masses. Male rats had markedly increased incidences of malignant neoplasms (which can include benign or malignant growths) of the lining of tissues and increased incidences of neoplasms in the kidney and respiratory epithelium (lining) of the nose. Female rats had increased incidences of thyroid neoplasms and mononuclear cell leukemia (a cancer of cells with one nucleus such as white blood cells). Male mice had marked increases of neoplasms of the kidney, and female mice had increased incidences of neoplasms of the blood vessels in all organs as well as neoplasms of the liver, lung, and small intestine. All groups of male and female rats and mice exposed to vinylidene chloride had extensive noncancerous tissue abnormalities of the epithelium of the nose. Noncancerous tissue abnormalities of the lung of male rats and liver of male and female rats were also observed. Tests to evaluate the potential for vinylidene chloride to damage DNA produced inconclusive results.

Conclusions: *The NTP four-point scale rates the level of evidence that a substance has the ability to cause cancer in laboratory animals. Under the conditions of these 2-year inhalation studies, there was clear evidence that vinylidene chloride exposure has the ability to cause malignant neoplasms of the lining of tissues in male rats, kidney cancer in male mice, and systemic neoplasms of the blood vessels in female mice; some evidence that it has the ability to cause kidney cancer and benign neoplasms in the nose in male rats, thyroid cancer and leukemia in female rats, and liver cancer in female mice; and equivocal (uncertain) evidence that it has the ability to cause malignant neoplasms of the lining of tissues in female rats, liver cancer in male mice, and lung cancer and small intestinal cancer in female mice. In addition, vinylidene chloride exposure caused increased incidences of noncancerous tissue abnormalities in the nose of rats and mice, the liver of rats, the lung of male rats, and the kidney of male mice.*