

ETHYL ACRYLATE

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140-88-5

Hazard Summary

Exposure to ethyl acrylate is primarily occupational. Acute (short-term) exposure of workers to ethyl acrylate vapors has been reported to cause drowsiness, lethargy, headache, nausea, convulsions, and respiratory and gastrointestinal irritation. Noncancerous lesions and inflammation of the nasal mucosa and depressed body weight gain have been observed in rats and mice exposed by inhalation for a chronic (long-term) duration. Human studies on occupational exposure to ethyl acrylate/methyl methacrylate have suggested a relationship between exposure to the chemical(s) and colorectal cancer, but the evidence is conflicting and inconclusive. In a study by the National Toxicology Program (NTP), increased incidences of squamous cell papillomas and carcinomas of the forestomach were observed in rats and mice exposed via gavage (experimentally placing the chemical in the stomach). However, the NTP recently determined that these data were not relevant to human carcinogenicity and removed ethyl acrylate from its list of carcinogens. EPA has classified ethyl acrylate as a Group B2, probable human carcinogen, but has not developed a potency estimate to quantify risk by inhalation.

Please Note: The main source of information for this fact sheet is EPA's Health and Environmental Effects Profile for Ethyl Acrylate. (2) Other secondary sources include the Hazardous Substances Data Bank (HSDB) (1), a database of summaries of peer-reviewed literature, and the Registry of Toxic Effects of Chemical Substances (RTECS), a database of toxic effects that are not peer reviewed. (3)

Uses

- Ethyl acrylate is used in the manufacture of water-based latex paints and adhesives, textile and paper coatings, leather finish resins, and in the production of acrylic fibers. (2,7)

Sources and Potential Exposure

- Human exposure will be primarily occupational via inhalation and dermal contact. (1)
- Ethyl acrylate may be released into the environment in fugitive and stack emissions or in wastewater during its production and use. (1)

Assessing Personal Exposure

- No information was located regarding the measurement of personal exposure to ethyl acrylate.

Health Hazard Information

Acute Effects:

- Acute exposure of workers to ethyl acrylate vapors has been reported to cause drowsiness, lethargy, headache, nausea, convulsions, and respiratory and gastrointestinal irritation. (1)
- Lethargy, conjunctivitis, diarrhea, weight loss, and severe mucosal irritation have been observed in rodents

acutely exposed by inhalation. (2)

- Acute oral exposure has been reported to cause thickened forestomach mucosa, forestomach inflammation and lesions, and abdominal adhesions in rodents. (2)
- Ethyl acrylate is a potent skin irritant in rabbits. (2)
- Acute animal tests in rats, mice, and rabbits have demonstrated ethyl acrylate to have moderate acute toxicity from inhalation and ingestion and high acute toxicity from dermal exposure. (3)

Chronic Effects (Noncancer):

- No information is available on the chronic health effects of ethyl acrylate in humans.
- Nonneoplastic lesions and inflammation of the nasal mucosa and depressed body weight gain have been observed in rats and mice chronically exposed by inhalation. (2)
- In one study, the swelling of renal tubules and the liver, minor lesions on the liver and lung, and increased kidney weight were reported in rats chronically exposed by inhalation. (2)
- In rodents chronically exposed via gavage, an increased incidence of forestomach lesions and inflammation and ulcerations have been observed.
- Depressed body weight gain has been reported in rats and dogs chronically exposed in their drinking water. (2)
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for ethyl acrylate.

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of ethyl acrylate in humans.
- Decreased body weight, but no major malformations, were observed in the offspring of rats exposed to ethyl acrylate by inhalation. (2)
- The number of resorptions and incidence of delayed ossification were increased in orally exposed rats. (4)

Cancer Risk:

- A causal relationship for an increased incidence of colorectal cancer among workers occupationally exposed to ethyl acrylate/methyl methacrylate has been suggested, but there is conflicting evidence regarding this relationship. Other epidemiological studies show no evidence of carcinogenicity. (2)
- A 1986 NTP study (8) reported increased incidences of squamous cell papillomas and carcinomas of the forestomach in rats and mice exposed via gavage. However, in 2000 the NTP determined that these tumors were seen only when the chemical was administered at high concentrations, resulting in persistent and severe gastric tissue injury. Because significant chronic human oral exposure to high concentrations of ethyl acrylate is unlikely, the NTP delisted ethyl acrylate from its Report on Carcinogens.
- No dose-related statistically significant increases in tumor incidence have been observed in other studies of rodents exposed to ethyl acrylate in drinking water, by inhalation, and dermally. (2,4)
- EPA has classified ethyl acrylate as a Group B2, probable human carcinogen. (2,5)
- EPA has calculated an oral cancer slope factor of $0.048 \text{ (mg/kg/d)}^{-1}$ (5), but has not calculated a unit risk value for inhalation.

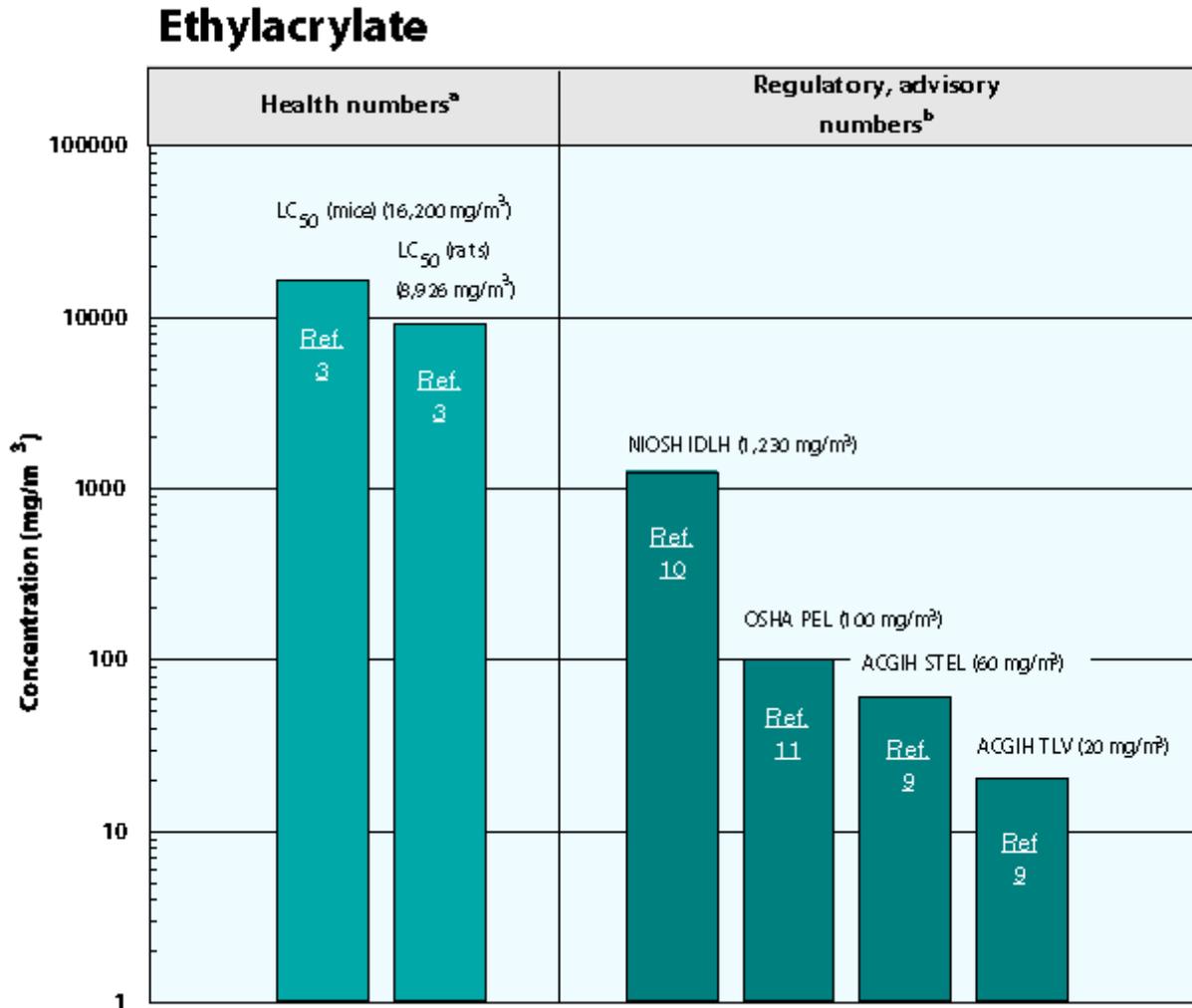
Physical Properties

- The chemical formula for ethyl acrylate is $\text{C}_5\text{H}_8\text{O}_2$, and its molecular weight is 100.11 g/mol. (7)
 - Ethyl acrylate occurs as a colorless flammable liquid that is slightly soluble in water. (1,2,5,7)
 - Ethyl acrylate has an acrid penetrating odor, with an odor threshold of 0.0012 parts per million (ppm). (7,8)
 - The vapor pressure for ethyl acrylate is 40 mm Hg at 26 °C, and its log octanol/water partition coefficient ($\log K_{ow}$) is 1.33. (2,5)
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Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : $\text{mg}/\text{m}^3 = (\text{ppm}) \times (\text{molecular weight of the compound}) / (24.45)$. For ethyl acrylate: 1 ppm = 4.1 mg/m^3 .

Health Data from Inhalation Exposure



ACGIH STEL--American Conference of Governmental and Industrial Hygienists' threshold limit value short-term exposure limit; a 15-minute TWA exposure which should not be exceeded at any time during a workday.

ACGIH TLV--ACGIH's threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.

LC₅₀ (Lethal Concentration₅₀)--A calculated concentration of a chemical in air to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.

NIOSH IDLH--National Institute of Occupational Safety and Health's immediately dangerous to life or health limit; NIOSH recommended exposure limit to ensure that a worker can escape from an exposure condition that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from the environment.

OSHA PEL--Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

The health and regulatory values cited in this factsheet were obtained in December 1999.

^a Health numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.

^b Regulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice. OSHA numbers are regulatory, whereas NIOSH and ACGIH numbers are advisory.

References

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