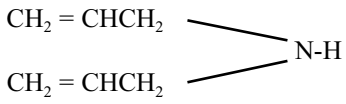
Diallylamine

Document History
Published: 1994
Revised: 2001
Rebranded: 2025

This OEL was originally established in 1994 and updated in 2001. A literature search to identify new toxicity information for Diallylamine was performed in August 2008. No new studies or data relevant to the OEL were identified.

I. IDENTIFICATION[1]

Chemical Name: 2-Propen-1-amine,
Synonyms: N-2-propenyl-2-propen-1-amine; Di-2-propenylamine; Diallylamine
CAS No.: 124-02-7
Molecular Formula: $C_6H_{11}N$
Structural Formula:



II. CHEMICAL AND PHYSICAL PROPERTIES[2,3]

Physical State: Colorless liquid
Odor Description and Threshold: Sharp. ammonia-like odor; the threshold is 2–9 ppm.
Specific Gravity: 0.787 g/mL at 20°C (68°F)
Molecular Weight: 97.16
Conversion Factors: 1 ppm = 3.97 mg/m^3
Boiling Point: 111°C (231°F) at 760 mmHg
Melting Point: -88°C (-126°F)at 760 mmHg
Vapor Density (Air = 1): 3.35
Vapor Pressure: 8 mmHg at 20°C (68°F)
Saturated Vapor Concentration: 24,000 ppm (95,280 mg/m^3)
Flammability Limits: No data available.
Flash Point (tag open cup): 15.6°C (60°F)
Autoignition Temperature: No data available.
Solubility in Water: 8%–9% by weight at 25°C (77°F)
Stability: Stable
Reactivity and Incompatibilities: Incompatible with acids, acid chlorides, strong oxidizing agents, and carbon dioxide.

III. USES

Corrosion inhibitor: ore flotation agent: rubber processor: oil solvent: cellulose ester solvent: and resin solvent.[2]

IV. ANIMAL TOXICITY DATA

A. Acute Toxicity and Irritancy (1–5 days)

1. Oral Toxicity

Rats: LD_{50} = 578 mg/kg[1,2,4]

Mice: $LD_{50=}$ = 355–516 mg/kg [1,2,4]

2. Eye Toxicity

Rabbits: Severely irritating[1]

3. Skin Toxicity

a. Absorption

Rabbits: LD_{50} = 280–356 mg/kg[1,2,4]

b. Irritation

Rabbits: Severely irritating[1]

c. Sensitization

No data available.

4. Inhalation Toxicity

Rats: 4-hr LC_{50} = 2755 ppm[1]

8-hr LC_{50} = 795 ppm[4,5]

Mice: 29 of 30 died at a 10-mm concentration of19,000 ppm.[6] The 15-min RD_{50} = 4 ppm[7]

RD = respiratory depression. A RD_{50} indicates a 50% decrease in the respiratory rate.

5. Intraperitoneal Toxicity

Mice: LD_{50} = 133-262 mg/kg [4]

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6. Intravenous Toxicity

Dogs: A 10 mg/kg intravenous injection caused an immediate drop of 22 nmHg in blood pressure, lasting 35 seconds with return to normal. The respiratory rate increased from 14 to 23.[8]

B. Genotoxicity

Diallylamine was not mutagenic when tested in four strains of Salmonella typhimurium bacteria (TA 98, TA 100, TA 1535, and TA 1537) (Ames Assay), with or without metabolic activation.[9]

C. Metabolism and Pharmacokinetics

No data available.

D. Developmental/Reproductive Toxicity

No data available.

E. Subacute Toxicity

Groups of 3 to 5 rats were exposed daily for 2 to 10 exposures (excluding weekends) for 7 hr to a concentration of 200 ppm. The authors reported observations of possible gross lesions in the heart muscle after 3 exposures, and a definite lesion was noted microscopically after 4 exposures. Possible lesions include fibrinoid degeneration, or engorged capillaries and hemorrhaging between muscle bundles or occasional increased cellularity and edema. Definite lesions varied from single foci to scattered small lesions or large diffuse lesions.[8]

F. Subchronic Toxicity

Rats (15 animals per group) were exposed to 0, 25, 50, 100, and 200 ppm of diallylamine for fifty 7-hr exposures 5 days a week) Significant increases in organ/body weight ratios were noted for the liver, kidneys, and lungs at 200 ppm; and for the heart at 50, 100, and 200 ppm. There was a significant organ/body weight ratio change for the testes at the 50 ppm exposure concentration; however, there were no significant changes noted at the 100 ppm and 200 ppm concentrations. At 200 ppm, heart lesions were noted in 8 of 10 survivors and 3 of 5 that died. No heart lesions were found at other concentrations, including the control group.[4,6,8]

Lesions were yellowish-white and varied in size from 50 of 4 ppm in mice has been identified for this compound; 1 mm in diameter to half the heart. Microscopically the lesions were found to vary in location and severity. The most common noted change was interstitial fibrosis with areas of necrosis of muscle bundles. Infiltration of polymorphonuclear cells was common. Inflammation of small blood vessels was usual with no thrombi found. Since 50 ppm was the lowest concentration where a significant organ/body weight ratio percent change was noted, and no heart lesions were reported at concentrations less than 200 ppm, 25 ppm is considered the no observable effect level (NOEL) in this study.

G. Chronic Toxicity/Carcinogenicity

No data available.

V. HUMAN USE AND EXPERIENCE

Experimental human exposures describe diallylamine as recognizable but not unpleasant at between 2 ppm and 9 ppm. Mucous membrane irritation and chest discomfort were noted in a few subjects at 22 ppm. At 70 ppm, exposure to diallylamine is considered severe but not intolerable. Diallylamine is detectable at "low" concentrations, and operators working with this material have not experienced cardiovascular effects.[2,4]

VI. RATIONALE

The dermal LD_{50} in rabbits was 280–356 mg/kg, and 50 in rabbits was diallylamine is considered to be toxic via skin absorption.

Diallylamine is considered to be severely irritating to the eyes and skin. An RD_{50} of 4 ppm in mice has been identified for this compound ; however, human experience has noted respiratory irritation at 22 ppm. No irritation was noted between 2 ppm and 9 ppm.

Subchronic inhalation testing in rats has identified significant changes in organ/body weight ratios for the liver, kidney, and lungs at 200 ppm, and for the heart at 50,100, and 200 ppm. Heart lesions were noted in 8 of 10 survivors, and 3 of 5 rats that died (5 deaths occurred at 200 ppm). The significant change in organ/body weight for the testes at 50 ppm is of questionable significance because higher concentrations (100 ppm and 200 ppm) failed to show significant organ/body weight ratio changes. Concentrations at 25 ppm did not show significant changes in organ/body weight ratios.

The subchronic inhalation testing identified a NOEL of 25 ppm. Although the RD_{50} for diallylamine is 4 ppm, human experience indicates the odor to be recognizable at 2–9 ppm. Those working with diallylamine have not experienced untoward cardiovascular effects, however. Based on a NOEL of 25 ppm in the subchronic toxicity study and the absence of 1 ppm should provide adequate worker protection. A human respiratory irritation at concentration of between 2 ppm and 9 ppm, a OEL of 1 ppm should provide adequate worker protection. A "skin" notation is added to indicate that absorption through the skin could contribute to the total exposure

VII. RECOMMENDED OEL

8-hr time-weighted average: 1 ppm (3.97 mg/rn^3) (skin).

VIII. REFERENCES

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