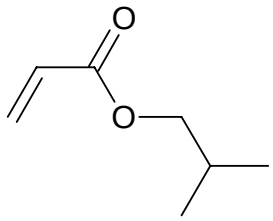
SIDS INITIAL ASSESSMENT PROFILE

CAS No.	106-63-8
Chemical Name	Isobutyl acrylate
Structural Formula	

SUMMARY CONCLUSIONS OF THE SIAR

Category/Analogue Rationale

n-Butyl acrylate (CAS No. 141-32-2) will be used as an analog for iso-butyl acrylate based on structural similarities. A comparison of the experimental data on both chemicals for toxicokinetics, acute toxicity, corrosiveness and irritation, and genetic toxicity (*in vitro* and *in vivo*) further supports the analogy. Data on n-butyl acrylate will be used to address the repeated-dose, reproduction, and developmental toxicity endpoints. In addition, it will be used to supplement existing acute aquatic toxicity data.

Human Health

Results from an *in vitro* study indicate that iso-butyl acrylate is rapidly hydrolyzed to acrylic acid and alcohol by porcine hepatic esterases in phosphate buffer. The rate of this reaction is comparable to the hydrolysis of n-butyl acrylate.

Acute toxicity data on rats and rabbits are available for iso-butyl acrylate. In the three oral studies in rats, the LD50 were 4895 mg/kg bw (narcosis, staggering, apathy, lateral position), 6292 mg/kg bw (heavy breathing at 17800 mg/kg bw), and 6639 mg/kg bw (no clinical symptoms). In two acute rat inhalation (vapor) studies, the 4-hour LC50 values were 10.6 mg/L and 15 mg/L. Two acute dermal toxicity studies in rabbits indicate LD50 of 800 mg/kg bw (occlusive) and 4000 mg/kg bw (semi-occlusive).

Undiluted iso-butyl acrylate is irritating to rabbit skin and slightly irritating to rabbits eyes. Vapors of the material are irritating to the skin, eyes, and the respiratory tract. Though there is no evidence for a sensitizing effect from a study with a limited number of patients, iso-butyl acrylate should be considered as a potential sensitizing agent based on its structural similarity to n-butyl acrylate, a known sensitizer in animals and humans.

Iso-butyl acrylate has not been tested in repeated dose studies. In an n-butyl acrylate oral (drinking water) 90-day study in rats, using a satellite group (gavage) at 150 mg/kg/day, the only effects reported were a slight reduction in water consumption in all dose groups and a decrease in body weight gain in the highest dose group. The NOAEL (males) = 84 mg/kg bw/day and NOAEL (females) = 111 mg/kg bw/day. The NOAEL (gavage) (males and females) = 150 mg/kg bw/day. In a 90-day inhalation study rats were exposed to n-butyl acrylate, at 0, 21, 108, 211, and 546 ppm (0, 0.11, 0.57, 1.12, 2.90 mg/L). The primary effects at 211 ppm (1.12 mg/L) were irritation of eyes and nasal mucosa, reduced body weights (13.3 percent in males and 3.76 percent in females compared with controls), decreased potassium values (females) and an increase in alkaline phosphatase activity (females). At the highest dose of 546 ppm (2.90 mg/L), 31 of 40 animals died. The primary cause of death was due to the severe irritation of the

respiratory tract. The NOAEL = 108 ppm (0.57 mg/L/day) and the LOAEL = 211 ppm (1.12 mg/L/day). In a two–year inhalation study on n-butyl acrylate, rats (male/female) received whole body exposures of 0, 15, 45, or 135 ppm (0, 0.086, 0.258, 0.773 mg/L). There was a slight decrease in food consumption and slightly lower relative heart, kidney, liver and thyroid weights at the highest dose. A NOAEL was determined to be 45 ppm (0.258 mg/L/day) based upon localized and diffuse stippling of the corneal epithelium, cloudiness of the cornea, and various degrees of vascularization. The severity of nasal mucosa effects increased with dose and occurred at all doses in males and females. Effects ranged from slight atrophy of the neurogenic part of the olfactory epithelium at 15 ppm (0.086 mg/L) to partial loss of the columnar cell layer and stratified reserve-cell hyperplasia at 45 and 135 ppm (0.258 and 0.778 mg/L, respectively).

Iso-butyl acrylate was not mutagenic in the Ames assay, both with and without metabolic activation, when tested up to cytotoxic concentrations. *In vivo*, iso-butyl acrylate did not induce chromosome aberrations in a mouse bone marrow micronucleus test.

No carcinogenicity studies are available for iso-butyl acrylate. However, n-butyl acrylate was not carcinogenic to rats via inhalation up to 135 ppm (0.773 mg/L/day).

No reproductive or developmental toxicity studies are available for iso-butyl acrylate. However, repeated-dose studies (noted above) using n-butyl acrylate showed no effects in the reproductive organs. In developmental toxicity studies with rats via inhalation, n-butyl acrylate caused fetotoxic effects (resorptions and reduced number of live fetuses at $\geq$135 ppm) at maternally toxic concentrations. Following exposures of 25, 135 and 250 ppm, the NOAEL (maternal) = 25 ppm, based on reduced body weights and irritation to the eyes and nose; the NOAEL (developmental) = 25 ppm, based on post-implantation loss; and the NOAEL (teratogenicity) = 250 ppm. In a separate study, pregnant female rats were exposed to 100, 200 and 300 ppm n-butyl acrylate during gestation. A NOAEL for maternal toxicity could not be determined based on a reduction of absolute body weight gain at all doses. At 200 and 300 ppm there was a reduction in fetal body weights. Sporadic malformations occurred at 300 ppm and in the control group. The developmental NOAEL was 100 ppm and the NOAEL for teratogenicity was 300 ppm, the highest dose tested.

Environment

Iso-butyl acrylate is soluble in water at 2 g/L (25 °C), has a specific gravity of 0.89 g/cm^3 at 25 °C, and a log K_{ow} of 2.22. The vapor pressure is 9.34 hPa at 25 °C, and the melting point and boiling point are – 61°C and 139°C, respectively. Iso-butyl acrylate is indirectly photodegraded by reaction with hydroxyl radicals in the atmosphere with an estimated half-life of approx. 28 hours (calculated). Distribution modeling using Mackay Level I, indicates that iso-butyl acrylate is likely to partition mainly into the air (95.3 %) with smaller amounts partitioning into water (4.6 %) and negligible amounts distributing into other environmental compartments (0.05 % in soil and sediment, each.) The Level III fugacity model was run using TRI release data available for n-butyl acrylate. Results were comparable with Level I results. Level III modeling results are as follows: air 90.1 %, water 7.85 %, soil 2 % and sediment 0.0856 %. In a biodegradation test (according to ISO 14593), iso-butyl acrylate was degraded 71 % after 7 days and 89% after 14 days, showing that it is readily biodegradable. Based on a log K_{ow} of 2.22 and a calculated BCF of 10.22, the potential for bioaccumulation is expected to be low. HYDROWIN modeling gives a hydrolysis half-life of 16.5 years at 25°C and pH=7.

Acute aquatic toxicity studies are available for iso-butyl acrylate in fish, daphnia and algae. The most sensitive species was the freshwater fish *Pimephales promelas* (fathead minnow) with a 96-hour LC50 of 2.09 mg/L (measured). The 48-hour EC50 for *Daphnia magna* is 9.7 mg/L (nominal), and for algae (*Desmodesmus subspicatus)* the 72-hour EC50s were 3.18 mg/L (measured) for biomass and 5.28 mg/L (measured) for growth rate. Results from prolonged or chronic studies are not available. No information is available on terrestrial effects. In addition, supporting data from n-butyl acrylate indicate toxicity values with in the same ranges. In acute aquatic toxicity studies, n-butyl acrylate was determined to have toxic effects in the concentration range of 2.1 to 8.2 mg/L. A measured fish 96-hr LC50 of 2.1 mg/L was determined in a flow-through test in *Cyprinodon variegates.* A measured aquatic invertebrate 48-hr EC50 of 8.2 mg/L was determined in a flow-through test in *Daphnia magna.* Finally, in algae (*Selenastrum capricornutum*) a growth-rate study using nominal concentrations resulted in a 96-hr EC50 of 5.2 mg/L.

Exposure

Iso-butyl acrylate is used as a co-monomer in the manufacture of polymers. Polymers made with iso-butyl acrylate are primarily used in surface coatings, in films and pressure sensitive adhesives, in dispersions, and construction materials. The worldwide annual production is in the range of 1000 to 10000 tonnes per year. Exposure may occur during manufacture, transportation and industrial use. Worker exposure is adequately controlled at the production plants in the US. As a result of polymerization, end-use products contain only trace levels of iso-butyl acrylate.

RECOMMENDATION

The chemical is currently of low priority for further work.

RATIONALE FOR THE RECOMMENDATION AND NATURE OF FURTHER WORK RECOMMENDED

The chemical possesses properties indicating a hazard for human health and the environment. Based on data presented by the Sponsor country, exposure to humans and the environment is anticipated to be low, and therefore this chemical is currently a low priority for further work. Countries may desire to investigate any exposure scenarios that were not presented by the Sponsor country.