# SIDS INITIAL ASSESSMENT PROFILE

| | |
|---|---|
| **CAS No.** | 107-18-6 |
| **Chemical Name** | 2-Propen-1-ol |
| **Structural Formula** | $CH_2$=CH-$CH_2$-OH |

## SUMMARY CONCLUSIONS OF THE SIAR

**Human Health**

Animal studies demonstrate that 2-propen-1-ol appears to be oxidised readily in the liver, giving a variety of metabolic products, such as acrolein, acrylic acid, glycidaldehyde, and glyceraldehyde. Among these metabolites, the most reactive metabolite, acrolein may cause hepatotoxicity in the liver.

The inhalation LC50 is 0.140-0.150 mg/L for 8 hours exposure in rats under vapour conditions. In the OECD TG 403 study, the LC50 is > 0.530 mg/L under mist conditions in rats. No deaths were observed at the concentration of 0.530 mg/L after 4 hours' exposure. The dermal LD50 (rabbit) is 89 mg/kg bw. The oral LD50 values are 70 and 99-105 in rats, 96 in mice and 71 mg/kg bw in rabbits. The intraperitoneal LD50 values are 37 and 42 in rats, and 60 mg/kg bw in mice. A 55-year old man died within 100 minutes of oral ingestion of 2-propen-1-ol. The amount ingested was assumed to be 212 g of 2-propen-1-ol at the maximum. Death was attributed to acrolein-induced cardiotoxicity.

2-Propen-1-ol is considered to be slightly irritating to the skin and irritating to eyes in animals. Moreover, 2-propen-1-ol may cause irritation of the eye and nasal mucosa in humans. 2-Propen-1-ol is considered not to be a skin sensitizer in guinea pigs [OECD TG 406].

In a repeat dose inhalation toxicity study, male rats were exposed to 2-propen-1-ol at nominal concentrations of 0, 0.0024, 0.0047, 0.012, 0.047, 0.095, 0.142, 0.237 or 0.355 mg/L for 7 hours/day, 5 days/week for 12 weeks. Histopathology showed that there was slight congestion of the lungs and liver at the dose of 0.355 mg/L (150 ppm). The NOAEL for inhalation toxicity in male rats is 0.012 mg/L (5 ppm) based on a significant decrease in body weight gain in groups exposed to 0.047 mg/L (20 ppm) and higher.

In a repeated dose oral toxicity study, 2-propen-1-ol had adverse effects on kidney tissues in rats, administered in the drinking water continuously for 15 weeks at or above a level of 100 ppm (8.3 mg/kg bw/day in males and 6.9 mg/kg bw/day in females). The NOAEL was 50 ppm of 2-propen-1-ol in drinking water (equivalent to 4.8 mg/kg bw/day in male rats and 6.2 mg/kg bw/day in female rats) based on adverse effects on kidney tissues (increases in absolute kidney weight and relative kidney weight) for females and on an increase in relative stomach weight for male and females at 100 ppm.

The *in vitro* studies, including reverse mutation assays in bacteria (*S. Typhimurium*: positive in T1535 with S9, TA100 without S9; negative in TA97, TA98, TA100 and TA1535 without S9), microbial forward mutation and fungal point mutation assays (*Streptomyces coelicolor* and *Aspergillus nidulans*, respectively: negative) and gene mutation in mammalian cells (V79 cells: positive) gave conflicting results, , while the *in vivo* studies concerning micronucleus and the dominant lethal assay in rodents gave negative results. Based on these data *in vitro* and *in vivo*, there is equivocal evidence that 2-propen-1-ol may be genotoxic.

A carcinogenicity study was conducted with male and female Fischer 344 rats via drinking water (300 mg/L, total dose of 3.2 g) for 106 weeks, followed by observation until natural death (123-132 weeks). The study gave no clear evidence of carcinogenicity in male rats, but there was equivocal evidence of carcinogenicity in the liver of female rats.

Reproductive/developmental toxicity was studied in SD rats by gavage at doses of 0, 2, 8 or 40 mg/kg bw/day [OECD TG 421]. Males were dosed from 14 days before mating for total of 42 days, and females were dosed from 14 days before mating throughout the mating and pregnancy period to day 3 of lactation. The autopsy was conducted on the day after the final administration. No deaths were found in any group. Clinical findings in parental animals at 40 mg/kg bw/day were salivation, decrease in locomotor activity, irregular respiration (male and female), lacrimation and loose stool (male). Histopathological examinations at 40 mg/kg bw/day revealed atrophy of the thymus and

hyperplasia of luteal cells in the ovary in females, necrosis, fibrosis, proliferation of bile duct, hypertrophy, and brown pigment deposition in perilobular hepatocytes, and diffuse clear cell changes in males and females, and hyperplasia of squamous epithelium in the forestomach in males. In male rats, no changes in histopathological findings or weight of the testes and epididymis were found. In females, extension of mean oestrous cycle length and increase in females with irregular oestrous cycle were observed at 40 mg/kg/day group. There were no adverse effects on the other reproductive performance parameters (such as the mating index, fertility index, numbers of corpora lutea or implantations, implantation index, delivery index, gestation index, gestation length, parturition or maternal behaviour). In examination of offspring, decrease in viability index on day 4 and total litter loss (from one dam) were observed at 40 mg/kg bw/day group. There were no treatment-related findings in the external appearance, general conditions and necropsy findings in the offspring.

The NOAEL is considered to be 8 mg/kg bw/day for general toxicity and reproductive/developmental toxicity. In a prenatal developmental study conducted in SD rats, 2-propen-1-ol was administered by gavage at doses of 0, 10, 35, or 50 mg/kg bw/day to pregnant rats on gestation days 9 to19 [OECD TG 414]. At doses of 10 mg/kg bw/day and higher significant toxicity in dams was observed. Maternal toxicities at 35 and 50 mg/kg bw/day were mortalities, clinical findings, reductions in body weight gain and feed consumption, macroscopic liver findings and increased liver weights. One female at 10 mg/kg bw/day also had macroscopic liver findings. An increased frequency of total litter loss was observed at 35 and 50 mg/kg bw/day dose levels. In case of total litter loss, severe toxicities were observed in the dam (loss of body weight, severe decreases in feed consumption, and evidence of significant liver toxicity). Despite the severe maternal toxicity observed, there were no 2-propen-1-ol related increases in malformation rates or incidence of variations. 2-Propen-1-ol had no effects on intrauterine growth or survival in the fetuses from dams that survived to necropsy. Therefore, 10 mg/kg bw/day was considered to be the LOAEL for maternal toxicity, based on liver findings, and 10 mg/kg bw/day was considered to be the NOAEL for developmental toxicity, based on an increased frequency of total litter loss at 35 and 50 mg/kg bw/day, when 2-propen-1-ol was administered orally by gavage to pregnant rats.

**2-Propen-1-ol possesses properties indicating a hazard for human health (acute toxicity, repeated dose toxicity, irritation, genotoxicity, carcinogenicity, reproductive/developmental toxicity). Adequate screening level data are available to characterize the human health hazard for the purposes of the Cooperative Chemicals Assessment Programme.**

**Environment**

2-Propen-1-ol is a colourless liquid and is miscible with water. Melting point, boiling point, vapour pressure and partition coefficient are -129 °C, 96.9 °C, 25 hPa (20 °C) and log Kow = 0.17, respectively. 2-Propen-1-ol is not expected to be hydrolyzed under normal environmental conditions. Indirect photo-oxidation by hydroxy radicals in the atmosphere is predicted to occur with a half-life of 4.32 hours. 2-Propen-1-ol is readily biodegradable under aerobic conditions within 14 days (BOD = 86 %). The estimated BCF is 3.2 and there is low potential for bioaccumulation. Fugacity Model Mackay level III calculations indicate that 2-propen-1-ol will be distributed mainly to air (67.6 %) water (25.1 %) and soil (7.3 %) compartment if released to air, while 2-propen-1-ol will stay exclusively in the water compartment (99.7 %) if released to water. If released to soil, 2-propen-1-ol will be distributed mainly to the water (19.4 %) and soil (80.4 %) compartment. If released simultaneously to air, soil and water, 2-propen-1-ol will be distributed mainly to water (62.1 %) and soil (36.7 %) compartment. Henry's Law constant is $4.99 \times 10^{-6}$ atm.m$^3$/mole.

Acute toxicities to fish (96-h LC50) are 0.59 mg/L (Medaka) [OECD TG 203] and 0.32 mg/L (Fathead minnow). Acute toxicity to *Daphnia magna* (48-h EC50) is 2.1 mg/ L [OECD TG 202]. The 48-h LC50 in Polychaete (*Ophryotrocha diadema*) is 0.33-1.0 mg/ L. Acute toxicities to green algae (*Pseudokirchneriella subcapitata*) are 5.4 mg/L (72-h ErC50) and 2.3 mg/L (72-h EbC50) [OECD TG 201]. The NOEC of 21-d chronic toxicity in *Daphnia magna* is 0.92 mg/L [OECD TG 211]. The NOEC value in green algae (*Pseudokirchneriella subcapitata*) is 0.93 mg/L (72-h for growth rate and biomass) [OECD TG 201].

**2-Propen-1-ol possesses properties indicating a hazard for the environment (acute toxicity in algae, fish and daphnia and chronic toxicity in daphnia). Adequate screening level data are available to characterize the environmental hazard for the purposes of the Cooperative Chemicals Assessment Programme.**

**Exposure**

The production volume of 2-propen-1-ol was estimated at 136,100 t/year worldwide in 2003 and 45,000 t/year in Japan in 2001. Two producers in Japan account for approx 30-40 % of global production. 2-Propen-1-ol is an

important starting material, and is used in the manufacture of 1,4-butandeiol, 2-methyl-1,3-propandiol, allyl diglycol carbonate, diallyl phthalate, diallyl isophthalate, allyl glycidyl ether, epichlorohydrin, allyl methacrylate, styrene 2-propen-1-ol and resins for coating applications, flavorings such as allyl hexanoate, contact herbicide, as an intermediate for manufacturing pharmaceuticals, fire retardants and herbicides.

2-Propen-1-ol is exclusively used as an intermediate in chemical synthesis. Occupational exposure is possible by the inhalation and dermal routes at the manufacturing and user sites. No consumer use is known for 2-propen-1-ol. However, monitoring data provided by the sponsor country indicate that potential indirect exposure via the environment is anticipated.

Consumers may be potentially exposed to 2-propen-1-ol from ingestion of foods. 2-Propen-1-ol has been detected in crab meat, mussels and garlic. 2-Propen-1-ol is rapidly formed in the body from the hydrolysis of allyl esters used as flavour agents in food. The estimated intake of 2-propen-1-ol from this route is 18µg/kg bw/day in Europe and 5.8 µg/kg bw/day in the USA.

MOE, Japan monitored 2-propen-1-ol concentrations in the environment such as air, well water, sea water and river water throughout Japan. Based on these studies the estimated human exposure (EHE) is calculated to be 0.027 ug/kg bw/day under the standardised Japanese condition. A second Japanese monitoring study performed in the Kitakyushu-city area reported that no 2-propen-1-ol was detected in sea water, river water, reservoir water and effluent of sewage treatment plant in addition to well water, tap water and rain water at the limit of detection of 0.008ug/L.