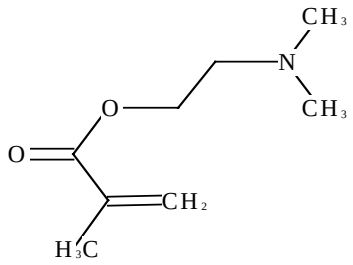
SIDS INITIAL ASSESSMENT PROFILE

CAS No.	2867-47-2
Chemical Name	2-Dimethylaminoethyl methacrylate
Structural Formula	

RECOMMENDATIONS

The chemical is currently of low priority for further work.

SUMMARY CONCLUSIONS OF THE SIAR

Human Health

2-Dimethylaminoethyl methacrylate is supposedly metabolized to methacrylic acid and N,N-dimethylaminoethanol. Then the methacrylic acid may form an acetyl-CoA derivative, which then enters the normal lipid metabolism. The oral LD_{50} in rats is greater than 2000 mg/kg. This chemical is considered to be severely irritating or corrosive to skin and eye. This chemical does not have a sensitizing potential.

The OECD combined repeated dose and reproductive/developmental toxicity screening test [OECD TG 422] was conducted in rats at doses of 0, 40, 200 and 1000 mg/kg/day administered by gavage. For both sexes, a clear systemic toxicity was demonstrated only at 1000 mg/kg/day. Late onset of twitching, chronic convulsion and the suppression of body weight gain were observed. Three females out of 12 died. Histopathological examination revealed degeneration of nerve fibers in the brain and spinal cord, and hyperplasia of the mucosa, edema and inflammatory cell infiltration in the forestomach in both sexes. Increases in organ weights without histopathological changes were observed in the kidneys of both sexes, the livers of males, and the adrenals of females in this group. For the males in this group, BUN was slightly increased and anemic changes such as decreases in erythrocyte counts, hemoglobin concentration and hematocrit value, associated with a significant increase in reticulocyte ratio were observed. In males from the 200 mg/kg/day group, only slight anemic changes such as those observed at 1,000 mg/kg/day were seen, but the severity was considered toxicologically insignificant. The NOAEL for the repeat dose toxicity is considered to be 200 mg/kg/day.

A repeated inhalation study for 3 weeks revealed a NOEL of 100 ppm. Nose and eye irritation was observed at 250 ppm (LOEL).

Two independent gene mutation tests in bacteria [OECD TG 471 & 472] resulted in negative results except for a positive result in *S. typhimurium* TA 1537 at 2500 ug without metabolic activation in one study. A HPRT study on Chinese hamster cultured cells [OECD TG 476] was negative. A chromosomal aberration test *in vitro* [TG 473] and

a human lymphocyte test were positive with and without metabolic activation. However two *in vivo* studies [micronucleus assay, OECD TG 474] by i.p. or gavage respectively, gave negative results. Based on the weight of evidence, it is concluded that this chemical is not genotoxic *in vivo*.

In the above-described OECD combined repeated dose and reproductive/developmental toxicity screening test [OECD TG 422], there was no sign of reproductive toxicity up to 1000 mg/kg/day for males. Three females in the 1,000 mg/kg/day group, however, lost all of their pups in the lactation period. As to the developmental effect, the pups born from the females in the 1000 mg/kg/day group showed a lower body weight although no external abnormalities were observed. The NOAEL of the reproductive/developmental toxicity is considered to be 200 mg/kg/day for both parents and offspring.

Environment

Abiotically 2-dimethylaminoethyl methacrylate is hydrolyzed at pH7 and at pH 9 with a half-life of 4.54 days and 3.31 hours, respectively, whereas it is stable at pH 4. This chemical is readily biodegradable ([OECD TG 301E]; BOD: 95.3 % after 28 days), and has low bioaccumulation potential based on its log Kow of 1.13.

This chemical has been tested in a limited number of aquatic species including algae, daphnids and fish. The toxicity results (growth inhibition: [OECD TG 201]) for algae (*Selenastrum capricornutum*) were 41.6 mg/L (72 h-EC_{50}) and 18 mg/L (72 h-NOEC). The acute (immobility: [OECD TG 202]) and chronic (reproduction: [OECD TG 211]) toxicity results for daphnids are 33 mg/L (48h-EC_{50}), 16.6 mg/L (21d-LC_{50}), 7.86 mg/L (21d-EC_{50}), and 4.35 mg/L (21d-NOEC), respectively. The acute LC_{50} (96 hr: [OECD TG 203]) and prolonged LC_{50} (14 d: [OECD TG 204]) for fish (Medaka; *Oryzias latipes*) were 19.1 mg/L and 5.26 mg/L, respectively. Although 2-dimethylaminoethyl methacrylate can be hydrolyzed in these test conditions to methacrylic acid and dimethylaminoethanol, these results are, however, consistent with the aquatic toxicity of the metabolites reported in the respective SIARs issued in the past.

Exposure

The production volume of 2-dimethylaminoethyl methacrylate was estimated at approximately 8,000 t/year in Japan and 48,000 t/year world-wide in 2000. 2-Dimethylaminoethyl methacrylate is produced in a fully-closed system. Most of 2-dimethylaminoethyl methacrylate is industrially converted to the quaternary ammonium salt and polymerized for flocculant use in water treatment. This chemical is also used as a component monomer of copolymers in the polymer industry, and the products are used for paper agents, coatings and others. The workplace exposures during those application processes are controlled. Fugacity modeling (Mackay level III) predicts that 2-dimethylaminoethyl methacrylate released to water unlikely will migrate into other compartments. 2-Dimethylaminoethyl methacrylate is readily biodegradable and not persistent in the water phase. When this chemical is released to air, 72 % stays in air and 28 % is transported into water and soil.

During production and use of this substance occupational exposure is possible by inhalation of vapor. Consumer exposure is controlled because it is limited to the non-dispersive use.

Migration of residual monomer from the polymer matrix is expected to be low. Nevertheless, the possibility of exposure cannot be excluded.

NATURE OF FURTHER WORK RECOMMENDED

The chemical is not a candidate for further work considering the low bioaccumulation potential, ready biodegradability and low aquatic toxicity.