## SIDS INITIAL ASSESSMENT PROFILE

CAS No.	75-18-3
Chemical Name	Dimethyl Sulfide
Structural Formula	H <sub>3</sub> C CH <sub>3</sub>
SUMMARY CONCLUSIONS OF THE SIAR	
Human Health	
No reliable toxicokinetic studies were available; however, following acute inhalation exposure (death occurring within 8 minutes), dimethyl sulfide was found widely distributed in tissues of mice.	
In rats, the acute 4-h inhalation $LC_{50}$ was 40250 ppm (102 mg/L). Based on secondary literature, dimethyl	

sulfide was slightly irritating to rabbit skin and eye. There was no reliable study to determine skin sensitization of dimethyl sulfide.

In a repeated-dose toxicity study, 15 rats/sex were orally dosed for 14 weeks at doses of 0 (corn oil), 2.5, 25, or 250 mg/kg bw /day. No toxicity was observed at the doses tested. Histopathological examination revealed some degree of fatty degeneration of the liver cells and chronic inflammation of lungs and kidneys. These changes were not treatment-related as the incidence and severity of these changes were comparable to the control group. The NOAEL for subchronic exposure was 250 mg/kg bw/day.

Dimethyl sulfide was not mutagenic to *Salmonella typhimurium* or *Escherichia coli* (bacterial reverse mutation assay) *in vitro*, with or without metabolic activation. It was also negative in a DNA damage and repair assay using *Salmonella typhimurium*. Dimethyl sulfide was not mutagenic in an *in vivo* mouse micronucleus study. Overall, dimethyl sulfide was considered not to have mutagenic potential *in vivo* based on available data.

There were no reliable studies to determine the potential carcinogenicity of dimethyl sulfide.

Dimethyl sulfide had no effect on male or female reproductive organs following repeated oral dosing in rats for up to 14 weeks. When pregnant rats were dosed with dimethyl sulfide from gestation days 6 to 19 via gavage at doses as high as 1000 mg/kg bw/day, no maternal toxicity, embryo-fetal or developmental toxicity or teratogenicity was observed. Overall, based on the available animal studies, dimethyl sulfide was not toxic to reproduction or development and wa not teratogenic.

There are no known effects of dimethyl sulfide exposure in humans.

## Environment

The melting point of dimethyl sulfide is  $-98.3^{\circ}$ C and the boiling point is  $36.2 - 37.3^{\circ}$ C at 1013 hPa. The vapor pressure is 559.8 hPa at 20°C. The calculated log Kow is 0.919. The water solubility of dimethyl sulfide is 20 g/L (25°C) and density is 0.8483 g/cm<sup>3</sup> at 20°C.

Dimethyl sulfide is photodegraded by reaction with hydroxyl radicals in the atmosphere with a half-life of 2.8 days (calculated). Experimental studies show dimethyl sulfide is rapidly degraded in sunlight (natural and simulated) forming a number of breakdown products including sulfur dioxide. Dimethyl sulfide does not hydrolyze with hydrolysis half-lives of > 1 year at pH 4, 7 and 9.

Fugacity model Level III indicates dimethyl sulfide will distribute in air, water and sediment dependent on the

This document may only be reproduced integrally. The conclusions and recommendations (and their rationale) in this document are intended to be mutually supportive, and should be understood and interpreted together.

route of the emission. Fugacity model Level III distribution with 100% of the dimethyl sulfide released to air is: 98.6% (air), 1.3% (water), 0.1% (soil) and <0.01% (sediment); with 100% of the dimethyl sulfide released to water the distribution is: 8.6% (air), 91.2% (water), 0.01% (soil) and 0.2% (sediment); with 100% of the dimethyl sulfide released to soil the distribution is: 39.4% (air), 7.2% (water), 53.4% (soil) and 0.01% (sediment). Fugacity model Level III distribution with equal release of dimethyl sulfide to air, water and soil is: 28.1% (air), 57.2% (water), 14.6% (soil) and 0.1% (sediment)

A low bioaccumulation potential is expected based on the partition coefficient Log Kow of 0.919. Dimethyl sulfide is readily biodegradable (67.4% degraded over 28 days; OECD TG 301D).

The 96-hour  $LC_{50}$  for rainbow trout was 213 mg/L (measured) and the 48-hour  $EC_{50}$  values for *Daphnia magna* in two studies were 29 and 81 mg/L (measured). In two separate studies, the 96-hour  $EC_{50}$  values for biomass and growth rate of algae (*Pseudokirchneriella subcapitata*) ranged from 23 to > 113.7 mg/L.

## Exposure

The annual production volume of dimethyl sulfide in the United States is 10,000-15,000 tonnes. Dimethyl sulfide is used as a solvent and chemical intermediate for a wide range of organic materials including the production of dimethyl sulfoxide (DMSO). As one of the simplest organic substances containing sulfur, it is used as a sulfiding agent for catalysts in the refinery and petrochemical manufacturing processes, especially in ethylene manufacturing to control the formation of coke and carbon monoxide and in steel mill furnaces to control metal dusting. It is also used as a food flavoring agent and is listed in the Food Chemical Codex, approved for use by the U.S. FDA.

Dimethyl sulfide is primarily used in closed systems and environmental exposure is expected to be very limited. A small amount of dimethyl sulfide is used in natural gas as an odorant and may be released along with the natural gas in leaks from pipelines and gas facilities. Due to very low odor threshold limits, even small leaks can be detected. Most dimethyl sulfide used as a natural gas odorant would be burned. Other small amounts may be released in its use as a flavor or fragrance additive. Dimethyl sulfide is given off by marine organisms and therefore occurs naturally in marine waters.

A TLV of 10 ppm (25 mg/m<sup>3</sup>) TWA was adopted by the ACGIH in 2004 for dimethyl sulfide showing irritation as the TLV Basis-Critical Effect(s). Due to the low odor threshold (reported as low as 2.5 ppb) and extremely disagreeable odor, facilities typically limit exposure to well below the TLV to avoid odor complaints. Sampling from U.S. plants indicates that exposures over several years did not exceed the TLV and are generally less than 5 ppm with most exposures less than 1 ppm. The disagreeable odor of dimethyl sulfide provides for additional warning and avoidance of vapors.

The primary sources of consumer exposure to dimethyl sulfide are from leaks of natural gas and from its use as a flavoring agent. Humans can also be exposed to dimethyl sulfide produced naturally (e.g. by marine organisms). Due to its high volatility and odor, residues of dimethyl sulfide in products produced with or from the chemical are unlikely to exist.

## RECOMMENDATION AND RATIONALE FOR THE RECOMMENDATION AND NATURE OF FURTHER WORK RECOMMENDED

Human Health: The chemical is currently of low priority for further work because of its low hazard profile.

**Environment:** The chemical has properties indicating a hazard for environment (acute aquatic EC/LC50 values between 1 and 100 mg/l for invertebrates and algae). However the chemical is currently of low priority for further work for the environment because of its rapid biodegradation and limited potential for bioaccumulation.

This document may only be reproduced integrally. The conclusions and recommendations (and their rationale) in this document are intended to be mutually supportive, and should be understood and interpreted together.