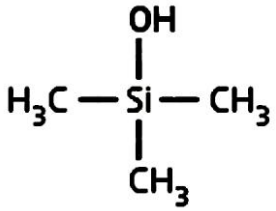
SIDS INITIAL ASSESSMENT PROFILE

CAS No(s).	1066-40-6
Chemical Name(s)	Trimethylsilanol
Structural Formula(s)	

SUMMARY CONCLUSIONS OF THE SIAR

Physical-chemical Properties

Trimethylsilanol is a liquid with a measured melting point of -11.9 °C, a measured boiling point of 97.9 °C and a measured vapour pressure of 19 hPa at 25 ºC. The measured octanol-water partition coefficient (log K_{ow}) is 1.22 at 25 ºC , and the measured water solubility is 0.995 g/L at 24 °C.

Human Health

Acute whole-body inhalation (OECD TG 403) and oral toxicity (OECD TG 401) tests indicate that trimethylsilanol can be absorbed to some degree from the respiratory and gastrointestinal tracts. However, trimethylsilanol is not expected to be absorbed by the dermal route based on an in vitro percutaneous (human skin) model (OECD TG 428). Repeated doses of trimethylsilanol (OECD TG 407) suggest some degree of distribution of the test substance in the body by oral administration.

In the four hour acute whole-body vapor inhalation study in rats, trimethylsilanol was administrated at doses 1824, 3517, 7443 ppm (measured; 6.7, 13.0, 27.4 mg/L)[OECD TG 403]. There were 0/10, 8/10 and 10/10 deaths for the 6.7, 13.0, and 27.4 mg/L groups, respectively. Local (respiratory and eye irritation) and systemic clinical signs (hypoactivity/prostration/ataxia) were noted during and following exposure. There were no effects on body weight. At gross necropsy, white areas on the spleen, clear fluid contents in the uterus and pale lungs were noted in the 6.7 mg/L (1824 ppm) group; there were no findings in the two surviving animals at 13.0 mg/L (3517 ppm). The LC_{50} was 11.6 mg/L (3151 ppm, combined for male and female).
The acute oral toxicity study, rats were administered trimethylsilanol by gavage at doses of 0.5, 1.0, 2.0, 3.1, 5.0 and 6.3 ml/kg bw (400, 800, 1600, 2480, 4000, and 5040 mg/kg bw [OECD TG 401]. Mortalities occurred at $\geq$ 1600 mg/kg bw. Clinical signs included effects on general condition and prone/lateral position. A reduction in body weight gain was reported. There were no gross macroscopic signs in animals surviving to study termination. The LD_{50} for male and female rats was 2800 mg/kg bw.

Trimethylsilanol is not a skin [OECD TG 404] or eye irritant [OECD TG 405] in rabbits, but may be an eye and respiratory tract irritant based on findings in an acute whole-body vapour inhalation study [OECD TG 403] with rats.

In a repeated dose inhalation study according to OECD TG 412, NOAEC for trimethylsilanol administration to rats by inhalation for two consecutive weeks (10 total exposures) was 1.1 mg/L (300 ppm) due to CNS/behavioral-related clinical signs (hypoactivity (males) and impaired equilibrium (females)) and macroscopic finding of diffusely pale lungs.
In a Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test via inhalation according to OECD TG 422 rats were exposed to 0, 0.22, 1.1 and 2.2 mg/L = 0, 60, 300, 600 ppm for 28 days, six hours/day, seven days/week (vapour, whole-body exposure). The NOAEC was 2.2 mg/L (measured), as no toxicologically significant test substance-related adverse effects were observed at any concentration tested.

In a repeated dose 28-day OECD TG 407 oral gavage study with GLP (0, 80, 250 and 750 mg/kg bw/day for 28 days) with male and female rats (5/sex/dose), the NOAEL was 250 mg/kg bw/day (male/female), based on clinical signs, reduction of body weight gain, and changes in the liver at 750 mg/kg bw/day. In a 28 day study (0, 10, 40, 160, and 640 mg/kg bw/day) conducted similar to OECD TG 407 with GLP, the NOAEL was 160 mg/kg bw/day for the male and female rat (5/sex/dose) following gavage administration, based on clinical signs of toxicity, decreased body weight gain, hematological effects, and/or organ weight effects at 640 mg/kg bw/day in both sexes.

Trimethylsilanol was negative *in vitro* and *in vivo* for both gene mutations [similar or according to OECD TG 471, 472, 476, 478] and chromosome aberrations [according to OECD TG 473, 474]. Trimethylsilanol caused a statistically significant increase in Sister Chromatid Exchange in the test without metabolic activation [EU B.19], but no increase with metabolic activation. The weight of evidence suggests trimethylsilanol is not genotoxic.

No data are available for the carcinogenicity of trimethylsilanol.

In a reproductive inhalation toxicity screening study according to OECD TG 422, rats were exposed by whole-body vapour inhalation for six hours/day, seven days/week to measured exposure concentrations (vapour) of trimethylsilanol at 0, 0.22, 1.1 and 2.2 mg/L = 0, 60, 300, 600 ppm (males: 28 days; females: 35-48 days throughout pre-mating, mating, and pregnancy periods until day 4 post-partum. An exposure level of 2.2 mg/L (the highest concentration tested, measured) was considered to be the NOAEC for fertility/developmental toxicity of trimethylsilanol, as no toxicologically significant test substance-related adverse effects were observed at any concentration tested.

In a developmental toxicity study according to OECD TG 414, pregnant rats (22/group) were administered trimethylsilanol by oral gavage on gestation days 6-20 at doses of 0, 50, 150 and 450 mg/kg bw/day. Clinical signs (uncoordinated movement, decreased activity and prostrate appearance), reduced food consumption and reduced body weight were observed in dams at 150 and 450 mg/kg bw/day. A reduced corrected body weight gain indicating maternal toxicity was observed at 450 mg/kg bw/day. Statistically significantly reduced fetal weights, delayed ossification and increased incidence of some cartilaginous variations of the fetuses, which suggested a slight disturbance in development, were observed at 450 mg/kg bw/day. The NOEL for maternal effects was 50 mg/kg bw/day due to the absence of maternal effects at this dose. However, the NOAEL for maternal effect was 150 mg/kg bw/day due to reduced corrected body weight gains indicating maternal toxicity at 450 mg/kg bw/day. The NOAEL for fetal developmental toxicity was 150 mg/kg bw/day based on developmental delays at 450 mg/kg bw/day.

Trimethylsilanol possess properties indicating a hazard for human health (potential for respiratory tract and eye irritation, repeated dose toxicity and developmental toxicity). Adequate screening-level data are available to characterize the human health hazard for the purposes of the OECD Cooperative Chemicals Assessment Programme.

Environment

Not all programs within EPI Suite have been validated for chemicals that contain the element Si, but recent upgrades to the Kow and water solubility modules, found in the current version of EPI Suite (v4.11), give reasonable estimates for silanes and siloxanes. For example, KOWWIN (v1.68 in EPI v4.11) has 32 chemicals containing Si in its combined training and validation sets. The water solubility programs WSKOWWIN and WATERNT have 0 and 19 combined training/validation chemicals with Si, respectively.

A reported value of log Koc, estimated through an indirect measurement, is 0.37 at 20-25 °C. Predicted values of soil Koc are 43.9 L/kg (KOCWIN MCI method; log Koc 1.64) and 11.44 L/kg (KOCWIN log Kow method; log Koc 1.06)

No test data are available for the hydrolysis of trimethylsilanol. Trimethylsilanol is an organosilicon compound with no hydrolysable groups. No hydrolysis of the Si-C bond has been observed in studies with organosilicon

substances.

Rate constants for indirect photodegradation with OH radicals were derived for the gas phase reaction of trimethylsilanol.

Experimental conditions	Half-life (days)	Half-lives based on the standard OH radical concentration, 1.5E6 molecules/cm^3 (12 hr day)
298 K, 740 Torr; 24-hr average OH radical concentration = 1 x 10^6molecules cm^{-3}	17*	14.8
297 K, 70 Torr; 24-hr average OH concentration = 7.7 x 10^5 molecules cm^{-3}	2.5	2.7
298 ± 2 K, 75 Torr; 24-hr average OH concentration = 7.7 x 10^5 molecules cm^{-3}	1.76	1.8
25 deg C; 12-hr day; 1.5E6 OH/cm^3; Overall OH Rate Constant = 3.8988 E-12 cm^3/molecule-sec (estimated; AOP Program (V1.92)	--	2.7

*lifetime=time to reach 1/e times the initial concentration

EPIWIN Level III fugacity modeling (Full-Output) predicts that trimethylsilanol, when distributed equally to air, water and soil, will partition to air (23.1%), water (42.9%) and soil (33.9%), with minor distribution to sediment (0.156%). The estimated dissociation constant (SPARC) is 14.2 (RL=4).

In an OECD TG 310 study, trimethylsilanol showed 0% degradation after 28 days, indicating it was not readily biodegradable under aerobic conditions. According to the BIOWIN v4.10 prediction, trimethylsilanol is not readily biodegradable.

The predicted BCF value (BCFBAF Program v3.01 in EPIWIN v4.10) for trimethylsilanol is 2.965L/kg, indicating it has a low bioconcentration potential and is not expected to be bioaccumulative.

The following acute and chronic toxicity test results have been determined for aquatic species:

Species	Effect level	Study Design
Fish [*Oncorhynchus mykiss*]	96 h LC_{50} = 271 mg/L (measured)	OECD TG 203, semi-static with GLP
Fish [*Danio rerio*]	96 h LC_{50} >519 mg/L (measured)	Similar to OECD TG 203, static with GLP
Invertebrate [*Daphnia magna*]	48 h EC_{50} = 124 mg/L (measured)	OECD TG 202, semi-static with GLP
Algae [*Pseudokirchneriella subcapitata*]	72 h EbC50 = 368 mg/L (geometric mean measured, biomass) 72 h ErC50 > 684 mg/L (geometric mean measured, growth rate) 72 h NOEC (cell density, biomass, and growth rate) = 44 mg/L (geometric mean measured)	OECD TG 201 with GLP
Algae [*Desmodesmus subspicatus*]	72 h E_bC_{50} = 806 mg/L (nominal); 72 h $E_rC_{50} \geq$ 1000 mg/L (nominal)	Similar to OECD TG 201 with GLP

Trimethylsilanol has a low hazard profile for the environment. The substance is not readily biodegradable and has a low bioaccumulation potential. Adequate screening-level data are available to characterize the environmental hazard for the purposes of the OECD Cooperative Chemicals Assessment Programme.

Exposure

In Japan (sponsor country), the production volume of trimethylsilanol in 2010 was < 227 tonnes (limit value

provided to protect confidential business information). No production of trimethylsilanol was reported in the United States and Europe. The substance is used only as an intermediate for manufacturing silicone fluids. No parent substance is expected to remain after end use.

The substance is manufactured in closed systems. Use of engineering controls at the manufacturing site includes local ventilation. Recommended personal protective equipment (PPE) includes safety glasses with side shield, rubber gloves, and respirator with organic vapor cartridge (note that a respirator is not required for handling trimethylsilanol, but necessary for organic solvent loaded together into the reaction vessel). Based on the use of engineering controls and PPE, the exposure of manufacturing workers is properly controlled. The substance is only used as an intermediate in industrial applications. There are no consumer uses of the substance.

Note: This document may only be reproduced integrally. The conclusions in this document are intended to be mutually supportive, and should be understood and interpreted together.