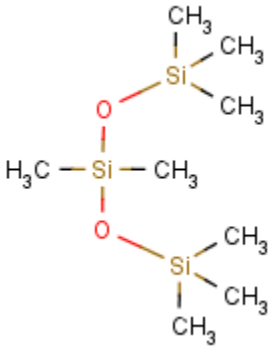
SIDS INITIAL ASSESSMENT PROFILE

CAS No.	107-51-7
Chemical Name	Octamethyltrisiloxane (L3)
Structural Formula	

SUMMARY CONCLUSIONS OF THE SIAR

Physical-Chemical Properties

The EPISuite program (v 4.0) developed by the U.S. Environmental Protection Agency and Syracuse Research Corporation has not been validated for chemicals that contain organosilicons in their molecular structure (although some measured data are included in the training data set); therefore, there is uncertainty associated with the calculated values and they should be used with caution whenever they are reported.

Octamethyltrisiloxane (L3) is a liquid with a measured melting point of less than -80 °C, a measured boiling point of 152.6 °C at 1013 hPa and a measured vapour pressure of 5.35 hPa at 25 °C. The measured octanol-water partition coefficient (log K_{ow}) is 6.60 at 24.1 °C, and the measured water solubility is 0.0345 mg/L at 23 °C. The measured Henry's law constant is 2.69 x 10^6 Pa-m^3/mole (1,100, dimensionless) at 20.9 °C. Values of the octanol-air partition coefficient (log K_{oa}) have been measured at temperatures between -4 and 40 °C; the value of log K_{oa} at 23.7 °C is 3.68.

Human Health

Toxicokinetics data were not available for L3.

The four-hour whole-body inhalation (OECD TG 403) LC_{50} value for L3 was > 22.6 mg/L in rats. The LD_{50} after single dermal application (OECD TG 402) to rats was > 2000 mg/kg bw. The acute oral (OECD TG 423) LD_{50} of L3 was determined to be > 2000 mg/kg bw in the rat. By all routes of exposure there were no deaths, no clinical findings, all animals gained weight and there were no significant macroscopic findings noted at necropsy. L3 was not irritating to the skin of rabbits (EPA OPPTS 870.2500); eye irritation data were not available. L3 was not a sensitizer in a human patch test.

In a combined repeated-dose/reproductive/developmental toxicity screening test (OECD TG 422), rats (10/sex/concentration) were exposed via whole-body vapour inhalation to L3 at 0 (filtered air control), 7.74, 15.5 and 31.0 mg/L. There were no test article-related effects on body weight, food consumption, FOB or motor activity

parameters. Male rats exhibited hyaline droplet nephropathy at all concentrations tested, which was consistent with alpha-2µ nephropathy. Both sexes showed significantly increased liver weights (females ≥ 7.74 mg/L and males at 31.0 mg/L) and significant increases in serum cholesterol (40% increase in males at all doses; 31% and 40% increase in females at 15.5 and 31.0 mg/L, respectively). Centrilobular hypertrophy was observed in females exposed to ≥ 7.74 mg/L, and in males exposed to 31.0 mg/L and was considered an adaptive change. Hepatic porphyria was observed in males at concentrations ≥ 15.5 mg/L. This condition is characterized by an abnormal increase of pigments (porphyrins) in the body. Porphyrins are the main precursor of heme, which is a major constituent of hemoglobin. Based on increased serum cholesterol, the LOAEC for systemic toxicity in males was 7.74 mg/L and the NOAEC was not established. The NOAEC for females was established at 7.74 mg/L based on increased serum cholesterol.

In an oral gavage repeated-dose toxicity study (OECD TG 407), rats were exposed to 0, 5, 25, 250 and 1000 mg/kg bw/day L3 for 28 days. There were no tretament-related effects on food consumption, FOB or motor activity parameters. A treatment-related reduction in the body weight / body weight gain compared to the control animals was recorded in the males at 1000 mg/kg/day at the end of the treatment period. During recovery, a significant compensatory increase in the body weight gain was noted in males and females at 1000 mg/kg bw/day. There were dose-response related increases in liver weights in males at 25, 250 and 1000 mg/kg bw/day, and females at 250 and 1000 mg/kg bw/day. Hepatocellular hypertrophy and protoporphyrin accumulation with associated bile duct proliferation and periportal chronic inflammation was observed in males at 250 and 1000 mg/kg bw/day and in females at the top dose only. Hematological parameters for high dose males showed an increased red blood cell (RBC) count with a reduction in the fraction associated with immature RBCs, and a decrease in mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH). Increased cholesterol and other changes in clinical chemistry were observed at the two highest doses in males and at the highest dose in females. After the 14-day recovery period, hepatocellular hypertrophy showed complete regression while protoporphyrin accumulation and periportal chronic inflammation was still present in both sexes at 1000 mg/kg bw/day. Bile duct proliferation persisted only in high dose males. There was an increased incidence and severity of hyaline droplets in males at 25, 250, and 1000 mg/kg bw/day and higher levels of alpha-2µ-globulin in males at all doses, which is not likely to be relevant to humans. Thyroid gland follicular cell hypertrophy of minimal severity was observed in both sexes at 1000 mg/kg bw/day. Hyaline deposits of the male kidneys and follicular cell hypertrophy of the thyroid gland showed complete regression after the 14-day recovery period. Based on multiple effects at 250 mg/kg bw/day, the NOAEL for males was considered to be 25 mg/kg bw/day, while for females it was 250 mg/kg bw/day, based on multiple effects at 1000 mg/kg bw/day.

L3 did not induce gene mutations in bacterial cells *in vitro* nor did it induce chromosomal aberrations in Chinese hamster ovary cells *in vitro*. In an *in vitro* mouse lymphoma assay, L3 induced chromosomal aberrations without metabolic activation, but did not induce aberrations with metabolic activation. Based on these results, L3 is not considered to be genotoxic *in vitro*. No data were available on the carcinogenicity of L3.

In the combined repeated-dose/reproductive/developmental toxicity screening test (OECD TG 422) described previously, no treatment-related effects were observed in any of the reproductive parameters or developmental endpoints evaluated. Reproductive and developmental parameters evaluated included evidence of mating, pregnancy, duration of gestation, mean litter size, mean live litter size, mean litter weight, and mean ratio of live births/litter size. The inhalation NOAEC for reproductive, maternal and developmental toxicity was 31.0 mg/L (highest concentration tested). Based on results of this screening-level test, L3 is not likely to result in reproductive or developmental toxicity.

Octamethyltrisiloxane possesses properties indicating a hazard for human health (repeated-dose toxicity). Adequate screening-level data are available to characterize the human health hazard for the purposes of the OECD HPV Chemicals Programme.

Environment

In an OECD TG 111 study, L3 is hydrolytically unstable; at pH 7 and 25 °C the half-life is 329 hours. Hydrolysis is expected to produce the hydrolysis product intermediate, pentamethyldisiloxanol (MDOH), and final hydrolysis products, dimethylsilanediol (DMSD) and trimethylsilanol (TMS). In the atmosphere, indirect photo-oxidation by reaction of L3 with hydroxyl radicals is predicted to occur with a half-life of 8.77 days. In a ready biodegradability

study, the average cumulative percent biodegradation for L3 was -3.7%, indicating the test substance is not readily biodegradable. MDOH and its condensed silanol monomers (TMS and DMSD) are expected to be not readily biodegradable. In an OECD Guideline 310 Test, TMS was not readily biodegradable (0% degradation after 29 days). Based on studies of DMSD (^{14}C-dimethylsilanediol) in four soils at 25 ºC, the substance is not readily biodegradable.

A level III fugacity model calculation with equal and continuous distributions to air, water and soil compartments suggests that L3 will distribute mainly to the air (27%), water (31%), and sediment (41%) compartments, with minor distribution to the soil compartment (1%). Additional simulations based on exclusive emission to a single compartment showed that the resulting distribution was strongly dependent on the compartment of emission. For emission to air or soil, L3 is predicted to remain in, or partition to, the air compartment overwhelmingly. When emission to water is involved, L3 is predicted to distribute between air, water, and sediment, with the exact distribution depending on the actual fraction of the total emission to water.

Modeling of the long range transport potential (LRTP) of L3 using the OECD Tool and GloboPOP models with empirical physical-chemical properties data as inputs indicates that L3 has long range transport potential. Environmental monitoring studies in Nordic countries and the arctic that have demonstrated that L3 is only rarely detected; and when detected is at extremely low concentrations.

In an OECD TG 305 study, *Pimephales promelas* were exposed to ^{14}C-L3 under flow through conditions at concentrations of 1.7 and 21 µg/L, for a 42-day uptake phase at 22 ºC, and a 10-day depuration phase. Radiolabeled test material was utilized for the study and parent confirmation was not done routinely. Analysis for metabolites at steady state indicated that 98% of the radiolabeled material was parent. Based on uptake and depuration rates the kinetic BCF values for the 1.7 and 21 µg/L treatment groups were 3610 and 5600, respectively. The estimated BCF values for hydrolysis products MDOH, TMS and DMSD are 32.99, 2.8 and 3.1 L/kg wet-wt suggesting low bioaccumulation potential of the hydrolysis products.

Due to the hydrolysis of L3, aquatic organisms are likely exposed to a mixture of the parent and its hydrolysis products, MDOH (transient intermediate), TMS and DMSD.

The following acute, chronic, and sediment toxicity test results to L3 have been determined for aquatic species:

Acute	
Fish [*Oncorhynchus mykiss*]	
96-hour LC_{50}	> 19 µg/L (flow-through)*
Invertebrate [*Daphnia magna*]	
48-hour EC_{50}	> 20 µg/L (flow-through)*
Algae [*Pseudokirchneriella subcapitata*]	
72-hour EC_{10}, EC_{20}, and EC_{50}	> 9.4 µg/L (closed-bottle)*
Chronic	
Invertebrate [*Daphnia magna*]	
21-day EC_{50} (mortality/immobility and reproduction)	> 15 µg/L (flow-through)*
21-day NOEC (for survival, reproduction and growth)	= 15 µg/L*
21-day LOEC (for survival, reproduction and growth)	> 15 µg/L*
Sediment	
Invertebrate [*Lumbriculus variegatus*]	
28-day EC_{50} (survival/reproduction/growth)	> 17 mg/Kg*
28-day NOEC (survival/reproduction)	= 1.1 mg/Kg
28-day LOEC (survival/reproduction)	= 1.6 mg/Kg
28-day NOEC (growth)	= 17 mg/Kg*
28-day LOEC (growth)	> 17 mg/Kg*
Invertebrate [*Chironomus riparius*]	
28-day LC_{50} (mortality)	= 166 mg/Kg
28-day NOEC (development time/emergence ratio)	= 84 mg/Kg

28-day LOEC (development time/emergence ratio)	= 210 mg/Kg
28-day NOEC (development rate)	= 84 mg/Kg
28-day LOEC (development rate)	= 39mg/Kg

*These results reflect the highest measured concentration tested and the functional limit of solubility under the conditions of administration (no effects at saturation).

Due to hydrolysis L3 possesses properties indicating a low hazard profile (at the limit of the water solubility), although it has potential to bioaccumulate and is not readily biodegradable. Adequate screening-level data are available to characterize the environmental hazard for the purposes of the OECD HPV Chemicals Programme.

Exposure

In the U.S.A. (sponsor country), production volume in 2005 was ca. 454 – 907 tonnes. L3 is also produced in Europe (45-113 tonnes in 2005) and Japan (45 - 91 tonnes in 2005). L3 is used in personal care and consumer products, as a chemical intermediate and as an intermediate for silicone oligomers and polymers. Percent used in formulation as a chemical intermediate is 0.1-100%; percent used in formulation in personal care products is 25-40%.

At the manufacturing site, L3 is produced in closed systems. Engineering controls such as local ventilation and ventilation devices, closed sampling systems; and fill systems are used. Personal protective safety equipment includes safety glasses or goggles, steel-tipped shoes, flame-resistant clothing, hard hat, chemical resistant gloves. Worker exposure due to non-accidental releases at the facility level is not expected. Potential routes of accidental worker exposure include inhalation and dermal. At the industrial customer level, it is recommended that L3 be used in closed systems. Recommend appropriate engineering controls include general ventilation. Gloves, goggles, and standard protective clothing are recommended when needed; all external customers are supplied with a MSDS for this product. Exposure due to non-accidental releases is not expected. Potential routes of accidental worker exposure include inhalation and dermal.

L3 is used in personal care consumer products; potential routes of consumer exposure include oral, dermal, and inhalation. Environmental exposure through the use of consumer products is likely.