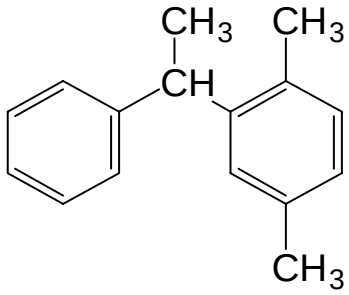
SIDS INITIAL ASSESSMENT PROFILE

CAS No.	6165-51-1
Chemical Name	1,4-dimethyl-2-(1-phenylethyl)benzene
Structural Formula	

SUMMARY CONCLUSIONS OF THE SIAR

Human Health

There are no available data on toxicokinetics, metabolism, or distribution.

In the acute toxicity study [OECD TG 401] with 1,4-dimethyl-2-(1-phenylethyl)benzene in Crj:CD(SD)IGS rats (5 animals/sex/dose), deaths were found in one male and two females at 2000 mg/kg bw. Soiled perianal region, decreased locomotor activity, bradypnea, and lateral position were observed in both sexes at 2000 mg/kg bw. The body weight gain was decreased at 1000 mg/kg bw and higher. The oral LD_{50} values were considered to be more than 2000 mg/kg bw in rats of both sexes.

In a combined repeated dose toxicity study with the reproduction/developmental toxicity screening test [OECD TG 422], Crj:CD(SD)IGS rats (12 animals/sex/dose) were given 1,4-dimethyl-2-(1-phenylethyl)benzene by gavage at 0 (vehicle: olive oil), 12.5, 50, or 200 mg/kg bw/day. Males were dosed for 47 days from day 14 before mating and females were dosed for 42-45 days from day 14 before mating to day 3 of lactation throughout the mating and pregnancy period. The body weight gain was decreased at 200 mg/kg bw/day in both sexes (5-8%). In urinalysis, increases in the volume and crystals and decreases in the osmotic pressure and specific gravity were detected at 200 mg/kg bw/day in males. Extension of the blood clotting time was observed at 50 mg/kg bw/day and higher in males. An increase in the total cholesterol levels was found at 50 mg/kg bw/day and higher in males. Increases in the γ-GTP and phospholipids levels of males and increase in the glucose levels of females were detected at 200 mg/kg bw/day. The liver weight was increased at 50 mg/kg bw/day and higher in males and at 200 mg/kg bw/day in females. The adrenal weight was decreased at 12.5 mg/kg bw/day and higher in males. In histopathological examinations, hypertrophy of the hepatocytes was observed at 50 mg/kg bw/day and higher in males and at 200 mg/kg bw/day in females. In the adrenals of male rats, atrophy of the zona fasciculate and an increase in the incidence of hypertrophy of the zona glomerulosa were found at 12.5 mg/kg bw/day and higher and at 200 mg/kg bw/day, respectively. Based on the pathological findings in the adrenals in males and in the liver in females, no NOAEL could be derived in male rats for repeated dose toxicity and the LOAEL for repeated dose toxicity was considered to be 12.5 mg/kg bw/day in male rats. In female rats, the LOAEL for repeated dose toxicity was 200 mg/kg bw/day and the NOAEL for repeated dose toxicity was considered to be 50 mg/kg bw/day.

In a reverse gene mutation assay [OECD TG 471], 1,4-dimethyl-2-(1-phenylethyl)benzene was not mutagenic in *Salmonella typhimurium* TA100, TA1535, TA1537, and TA98 or in *Escherichia coli* WP2 *urv*A either with or without an exogenous metabolic activation. In the chromosomal aberration test [OECD TG 473], 1,4-dimethyl-2-(1-phenylethyl) benzene did not induce structural chromosomal aberrations or polyploidy either with or without an

exogenous metabolic activation in cultured Chinese hamster lung (CHL/IU) cells.

The above-mentioned combined study [OECD TG 422], showed that the reproduction/developmental parameters, i.e., mating, pregnancy, delivery, lactation, and viability and body weight of pups, were not affected by administration of 1,4-dimethyl-2-(1-phenylethyl)benzene at up to 200 mg/kg bw/day. The NOAEL for reproduction/developmental toxicity was considered to be 200 mg/kg bw/day in rats. At 200 mg/kg/day, some parameters, number of implantations, implantation index, and numbers of newborns and live newborns (24%), were decreased, but not statistically significant. These values are within the range of historical control data for the performing laboratory.

No information on carcinogenicity is available.

Environment

1,4-Dimethyl-2-(1-phenylethyl)benzene is a colourless liquid with a melting point of $\leq$ -50 °C (OECD TG 102), boiling point of 305.9 °C (MPBPWIN v. 1.40), vapour pressure of 2.1 x 10^{-4} hPa (OECD TG 104) and water solubility of 0.96 mg/L at 25 °C (OECD TG 105). The measured log Kow is 5.39 (OECD TG107).
1,4-Dimethyl-2-(1-phenylethyl)benzene is photodegraded in the atmosphere by reaction with OH radicals with a half-life of 0.5 days. The hydrolysis rate of the substance is slow and no degradation was observed in a preliminary test (pH conditions of 4, 7 and 9, at 50 °C for 5 days) (OECD TG 111). 1,4-Dimethyl-2-(1-phenylethyl)benzene is not readily biodegradable (OECD TG301C). A generic fugacity model (Mackey level III) indicates that the substance mainly partitions to soil if released into soil or air and mainly to sediment if released into water. Experimentally derived BCF values of 760 and 620 (OECD TG 305) showed that the substance has a potential for bioaccumulation.

The ecotoxicity of 1,4-dimethyl-2-(1-phenylethyl)benzene have been studied by using aquatic species among three trophic levels. For fish an acute toxicity result 96 h LC50 of 0.31 mg/L (OECD TG 203, *Orizias latipes*, semistic test with analytical monitoring) is available. For daphnids an acute toxicity result on immobility, a 48 h EC50 of 0.25 mg/L (OECD TG 202 part 1, *Daphnia magna*) was reported. For aquatic plants an algal growth inhibition test (OECD TG 201, *Selenastrum capricornutum*) resulted in a 72 h ErC50 (growth rate) and a 72 h EbC50 (biomass) of >1.54 mg/L and 0.93 mg/L, respectively.
On chronic effects of this substance to aquatic organisms, two toxicity tests were carried out. For daphnids, a 21 d reproduction test (OECD TG211, *Daphnia magna*) showed a NOEC of 0.009 mg/L. For an aquatic plant, NOECs on algal growth inhibition were available. Those were (growth rate) NOEC (24-48 hr) of 0.37 mg/L, (growth rate) NOEC (0-72 hr) of 0.73 mg/L and (biomass method) NOEC (0-72 hr) of 0.047 mg/L based on the mean measured concentration (OECD TG 201, *Selenastrum capricornutum*). Results from chronic tests with fish are not available.

Exposure

In the year 2002 in Japan, only one company, produced 1,4-dimethyl-2-(1-phenylethyl)benzene as a mixture consisting of four homologue chemicals (CAS Nos. 6169-95-8, 6165-53-2, 64800-83-5 and 6416-39-3) with a total production volume of ca. 8000 tonnes (purity in a commercial product ca. 10%). It is assumed that few companies in Korea and China produce this substance as one component of a commercial product with a total production volume of a mixture ca. 1000 and 1500 tonnes in each country. No information on production volumes in other OECD countries is available.
1,4-Dimethyl-2-(1-phenylethyl)benzene is produced in a closed system by alkylation of styrene and xylene isomers in the presence of a solid acid catalysis. In Japan, 1,4-dimethyl-2-(1-phenylethyl)benzene is used as a substitute substance of PCBs and its main usage are as a solvent for pressure sensitive dyes (ca. 60%) and condenser oil (ca. 40%) for industrial use. Small amounts of 1,4-dimethyl-2-(1-phenylethyl)benzene are also used as a plasticizer for epoxy and uretane polymers, and a solvent as a substitute for trichloroethane.

Occupational exposure through inhalation of mist and dermal route is possible. Inhalation of vapor is expected to be minimal because the vapor pressure of this chemical is low.

RECOMMENDATION

The chemical is a candidate for further work.

RATIONALE FOR THE RECOMMENDATION AND NATURE OF FURTHER WORK RECOMMENDED

The chemical possesses properties indicating a hazard for human health, including repeated dose toxicity and uncertainty regarding reproductive toxicity in a screening test, and the environment (aquatic toxicity). It is recommended that an exposure assessment be performed to address possible exposure levels to the environment, workers and consumers based due to its use as a solvent, an alternative to PCBs and due to the recycling process of papers containing this chemical. Furthermore, a hazard assessment to sediment organisms and plants is also recommended and if necessary an environmental risk assessment should be performed.