SIDS INITIAL ASSESSMENT PROFILE

CAS No.	75-38-7
Chemical Name	1,1-Difluoroethylene or vinylidene fluoride
Structural Formula	$F_2C=CH_2$

RECOMMENDATIONS

The chemical is currently of low priority for further work.

SUMMARY CONCLUSIONS OF THE SIAR

Human Health

Metabolic/kinetic studies with vinylidene fluoride (VF2) in rats and mice indicate that during inhalational exposure, VF2 reaches a maximum level in blood at 15 minutes. Some metabolism takes place in the liver. It has been hypothesized that some fluoroacetic acid may be formed during metabolisation of VF2, which in turn may interfere with the citric acid cycle. However, mammalian toxicity study results do not indicate that this leads to structural or functional pathological changes.

Acute toxicity of VF2 is low with 1 hr LC00 of 200,000 ppm (524,000 mg/m^3) in rats. Only slight CNS effects were noted at very high concentrations (80% in air). Cardiac sensitization studies were negative. Several inhalation exposure studies have been conducted in rats and mice exposed 6h/d, 5d/week for 13 weeks. No target organs were consistently identified although effects on the kidney, spleen and testes were reported in various studies. In rats and mice the LOEC of 500 ppm (13,100 mg/m^3) was identified, based on body, organ weight and clinical chemistry changes in the absence of histopathological changes. A NOEC of 250 ppm (6,550 mg/m3) was identified in rats. At 40,000 - 50,000 ppm (104,8000 – 131,000 mg/m^3) effects on the nasal epithelium were noted in rats.

In chronic toxicity/carcinogenicity inhalation studies, rats and mice were exposed 6 h/d, 5d/week for 24 and 18 months, respectively at concentrations up to 10,000 ppm (26,200 mg/m^3). Neoplastic findings were comparable in control and treated animals. An earlier 52 week study in rats exposed orally to VF2 indicated increased lipomas/liposarcomas. However, this study was performed according to a protocol with significant deviations from currently prescribed guidelines and was reported in insufficient detail for proper evaluation. In genotoxicity studies, VF2 has shown some activity in bacterial assays, but was negative in the *in vitro* chromosomal aberration and gene mutation study in mammalian cells. *In vivo*, VF2 was negative in a mouse micronucleus and Drosophila SLRL test. Thus there is no evidence of genotoxicity *in vivo*. Overall, the results suggest that VF2 does not present a genotoxic hazard to man.

VF2 did not induce teratogenic or embryofetal toxicity effects in developmental toxicity studies in rats exposed up to 10,000 ppm during gestation days 6 –15. The NOEL for reproductive effects is $\geq$ 7000 ppm (18,340 mg/m^3) in rat studies.

Environment

VF2 is a gas at ambient temperatures and atmospheric pressure. Emissions will only occur during production and processing of VF2 and will partition nearly exclusively to air (>99%). Its low log P_{ow} does not indicate any significant bioaccumulative potential. In air, VF2 will be degraded by reaction with hydroxyl radicals. A half-life of

3.3 days has been calculated. Likely primary products resulting from the tropospheric degradation of VF2 are COF_2 and formaldehyde. Fluorogyloxal (CFOCHO) may also be a product of the degradation of VF2. The ultimate degradation products are formaldehyde, HF and CO2.

No biodegradation studies in water have been performed for VF2, however, related gaseous materials (tetrafluoroethane, pentafluoroethane, difluoromethane, 1-chloro-1,1-difluorethane, vinylidine chloride) generally showed < 10% degradation indicating that transformation to metabolites in soil or the water compartment may be considered very low. Based on these analogous substances, VF2 is not expected to be readily biodegradable and testing is not recommended. Due to specific physico-chemical properties of VF2 its production and use pattern, and its nearly exclusive partitioning to air, no aquatic toxicity testing has been performed. Using QSAR, the LC50 (96 hr) for fish is 245 mg/L, the daphnia LC50 (48 hr) is 250 mg/L and the green algae EC50 (96 hr) is 149 mg/L.

Exposure

VF2 is almost exclusively used as a monomer for the production of fluoropolymers (polyvinylidene flouride) and as copolymer with hexafluoropropylene and chlorotrifluoroethylene. In the United States, production is performed in closed systems and is anticipated to be representative of global production methods based on the chemicals physical chemical properties. Global production in 1999 was approximately 33,000 tonnes (72,600,000 pounds). The emissions of VF2 come exclusively from production and processing installations of VF2. The segment of the population exposed directly or indirectly to VF2 is very limited: workers during production and processing. Consumers manipulating goods made of VF2 (polymers) are not exposed to VF2. Possible emissions during production and processing are low and lead to very low atmospheric concentrations. VF2 is not expected to be released to water systems but in case of emissions will totally partition to air. It will not partition to the water from the air. VF2 is a flammable gas at ambient temperature (limits 4.7 % to 25.1%). Its flammability constitutes its most important physical danger.

NATURE OF FURTHER WORK RECOMMENDED

No recommendation.