SIDS INITIAL ASSESSMENT PROFILE

CAS No.	75-37-6
Chemical Name	1,1-Difluoroethane (HFC-152a)
Structural Formula	$F_2 - HC - CH_3$

SUMMARY CONCLUSIONS OF THE SIAR

Human Health

No toxicokinetic data for HFC-152a were found.

HFC-152a has low acute inhalation toxicity, with a 4-hour rat approximate lethal concentration (ALC) of 383,000 ppm. No valid acute oral toxicity studies are available. Although no standard test results are available, the repeat dose studies show some potential for irritation.
As with most HFCs, HFC-152a has the potential to produce cardiac sensitization in dogs challenged simultaneously with high exposure concentrations and high doses of exogenous epinephrine. Marked responses, which included a cardiac arrhythmia were observed in 3 of 12 dogs at 150,000 ppm. No response was observed at 50,000 ppm. No sensitization studies were available.

HFC-152a has low repeated dose toxicity. HFC-152a had anesthetic properties at a 100,000 ppm exposure level during a 2-week repeated dose inhalation study in rats. No other clinical, haematological, blood chemistry or histopathology effects were observed during the 2-week inhalation study. No adverse effects were observed in rats following a 3-month inhalation exposure to 25,000 ppm HFC-152a.

HFC-152a was not mutagenic in the *in vitro* bacterial reverse mutation test (Ames test) in *Salmonella typhimurium* and *Escherichia coli* strains. However, HFC-152a showed evidence of weak clastogenicity in an *in vitro* human lymphocyte chromosome aberration test. Further evaluation of the chromosome aberration potential using an *in vivo* micronucleus test produced negative results.

In a 2-year bioassay, HFC-152a was not carcinogenic to rats at inhalation exposure levels up to 25,000 ppm.

In a developmental study, female rats were exposed via inhalation up to 50,000 ppm during days 6 to 15 of pregnancy for 6 hours per day. No compound related maternal and developmental effects were observed at any of the concentrations tested, hence, the NOEL is 50,000 ppm. No histopathological or weight effects on reproductive organs were observed in male and female rats exposed up to 25,000 ppm HFC-152a for 6 hours per day, 5 days per week for 3, 12 or 24 months.

Environment

On the basis of its physical properties HFC-152a may be expected, when released to the environment, to partition almost exclusively into the atmosphere as it is a gas, with a vapor pressure at 25^{o}C of 6065.2 hPa, and it has a water solubility of 2.671 g/l at 25^{o}C. Any HFC-152a, which might be present in aqueous waste streams discharged directly into rivers or lakes would be expected, by analogy with similar compounds, to have a half-life with respect to volatilization of days or at the very most a few weeks. HFC-152a is expected to exist solely in the vapor-phase in the ambient atmosphere.

Vapor-phase HFC-152a is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals with a lifetime of 1.4 years. The atmospheric lifetime of this chemical suggests that it will mix throughout the troposphere with a globally averaged concentration in 2003 of about 2.6 ppt. Because of its IR absorption, it will contribute a very small amount to climate change with a global warming potential (GWP)

relative to CO2 of 140 for a time horizon of 100 years.

In addition, some HFC-152a is expected to gradually diffuse into the stratosphere above the ozone layer where it will slowly degrade due to reaction with hydroxyl radicals and direct photolysis from UV-C radiation. The ozone depletion potential (ODP) of HFC-152a has been determined to be negligible.

HFC-152a is not expected to adsorb to sediment or particulate matter. Bioconcentration is expected to be low based on an estimated BCF value of approximately 2 using the measured n-octanol/water partition coefficient (log value is 0.75). A Mackay Level III fugacity model (EPIWIN v.3.05) predicts that HFC-152a will partition mainly to the air (99.9%), with very little going to water (0.111%), and virtually none going to soil or sediment (0.01 and <0.01%, respectively).

Based on the ECOSAR predictions (96-hour LC_{50} in fish of 733 mg/L 48-hour EC_{50} in daphnids of 720 mg/L, and 96-hour EC_{50} in algae of 419 mg/L), actual toxicity test data for the analog chemical HFC-134a (96-hour LC_{50} in fish of 450 mg/L and 48-hour EC_{50} in daphnids of 980 mg/L), and the high Henry's Law Constant for these compounds (0.02 atm-m3/mole for HFC-152a), the predicted toxicity of HFC-152a to aquatic organisms is low.

Exposure

The primary uses for HFC-152a are as an aerosol propellant and a foam expansion agent. Other potential uses include refrigeration blends and catalyst regeneration. Production capacities are confidential, but are in excess of 5000 metric tonnes per year. In Korea, it is also used in maintaining of a catalytic activity and estimated usage volume of 1,1-difluoroethane was 4.63, 4.85, and 3.14 tonnes/year in 2003, 2004, and 2005, respectively.

Emissions from HFC-152a manufacturing facilities are small. In the sponsor country, small amounts of HFC-152a are used in a closed system. HFC-152a is treated with steam and emitted to wastewater plant. Fluorine is below the detection limit (1 mg/L) in discharged water. There are no reported natural sources of HFC-152a. HFC-152a used in propellant and foaming applications will be emitted to the atmosphere.

Industrial hygiene monitoring data during manufacture and industrial use show exposure to be well under acceptable exposure limits. The current AIHA WEEL (Workplace Environmental Exposure Limit) and DuPont AEL (Acceptable Exposure Limit) are 1000 ppm, 8-hour TWA (time-weighted average). Though consumer exposure has not been measured directly, modeling based on measurement of similar uses shows consumer exposure to be minimal during intended uses.

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

The chemical is currently of low priority for further work, due to its low hazard profile. Its global warming potential is acknowledged and is being addressed by other programs.