



MATERIAL SAFETY DATA SHEET

IDENTITY: ISOFLURANE (1-CHLORO-2,2,2-TRIFLUOROETHYL DIFLUOROMETHYL ETHER)

SECTION I: MANUFACTURER

HALOCARBON LABORATORIES                      Emergency Number:                      (803) 278-3504  
(Div. of Halocarbon Products Corp.)  
P.O. Box 661                                      Customer Service & Sales: (201) 262-8899  
River Edge, N.J.    07661  
Prepared by: Dr. Neville P. Pavri

SECTION II: CHEMICAL IDENTITY

Components	CAS No.	OSHA PEL	ACGIH TLV	Other Internal Guide
1-Chloro-2,2,2-Trifluoroethyl Difluoromethyl Ether	26675-46-7	None	None	50 ppm (8 hour TWA)

OSHA HAZARD RATING:

This product contains the following toxic chemical(s) subject to Section 313 Title III reporting requirements (40 CFR Part 372).

None

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point : 48.5 C                      Vapor Pressure: 330mmHg @ 20 C  
Melting Point : Not known                      Vapor Density(Air=1): >1  
Specific Gravity(H2O=1): 1.50                      Solubility in Water : Negligible

Appearance and Odor: Clear, colorless liquid with slight pungent odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point/Method: None                      Autoignition Temp: Not determined  
Flammability Limits in Air - LEL: N/A                      UEL: N/A

Extinguishing Media: Non-flammable. Use methods appropriate for surroundings.

Special Fire Fighting Procedures: Wear self-contained breathing apparatus if there is danger of leakage.

Unusual Fire and Explosion Hazards: Emits toxic and corrosive fumes under fire conditions.



=====  
SECTION V - REACTIVITY DATA

Unstable [ ] Conditions to Avoid: N/A  
Stable [X]

Incompatibility (Materials to Avoid): Reactive metals such as sodium, potassium, or finely divided zinc, aluminum or magnesium, especially at high temperature.

Hazardous Decomposition or By-products: Halogen acids and carbonyl halides formed by thermal or oxidative decomposition.

Hazardous Polymerization [ ] May Occur [X] Will Not Occur

Conditions To Avoid: N/A

=====  
SECTION VI - HEALTH HAZARD DATA

RTECS Number KN6799000  
Rat: oral LD50 4770 mg/kg (KSRNAM 21,3031,87)  
Rat: inhalation LC50 15,300 ppm/3 hours  
Rat: intraperitoneal LD50 4280 mg/kg  
Mouse: oral LD50 5080 mg/kg  
Mouse: inhalation LC50 16,800 ppm/3 hours  
Mouse: intraperitoneal LD50 3030 mg/kg  
Reproductive effects (RTECS)

Inhalation of isoflurane at a concentration of 0.5-3.0% can induce general anesthesia in 7 to 10 minutes, with analgesia, muscle relaxation, and loss of consciousness. Isoflurane is mildly pungent and may cause coughing, laryngospasm and breath holding in an unconscious individual; secretions may be slightly stimulated and pharyngeal and laryngeal reflexes may be obtunded. Isoflurane is a severe respiratory depressant, causing a decreased tidal volume that may produce hypercapnia. Blood pressure is depressed with an initial decrease in systemic vascular resistance, heart rate and cardiac output, although rate and output may increase due to compensatory mechanisms. Arrhythmias can occur, and the myocardium may be slightly sensitized to epinephrine. Renal blood flow, glomerular filtration and urine flow are decreased without residual renal depression or renal injury following isoflurane anesthesia. Isoflurane does not appear to produce liver injury when given for prolonged periods. Inhalation of higher concentrations may lead to death by medullary paralysis. Those recovering from exposure may exhibit shivering, nausea, vomiting, ileus, or excitation, and there may be a transient white blood count increase. A slight decrease in intellectual function may persist for 2-3 days, with small mood changes or symptoms possible for 6 days. Induction of general anesthesia may cause malignant hyperthermia from hypermetabolism of skeletal muscles in susceptible individuals.

Target organs are respiratory, cardiovascular and central nervous system.

Primary routes of entry: [X] Inhalation [X] Skin [ ] Eyes [ ] Oral

Acute Effects of Overexposure: Anesthesia, respiratory depression, coughing



Chronic Effects of Overexposure: No present evidence demonstrates that isoflurane is a mutagen, teratogen or carcinogen.

In a study by Corbett, male Swiss ICR mice (but not females) exposed to isoflurane were found to have a higher incidence of liver tumors than control mice. The study was found to be flawed. When the flaws were corrected the results were negative.

May cause sterility or other reproductive effects.

Carcinogenicity listing: [NO ] NTP [NO ] IARC [NO ] OSHA  
[NO ] Other:

IARC Cancer Review: Group-3, Human Inadequate Evidence, Animal Inadequate Evidence.

Exposure Limits/Toxicity: See also Section II  
NIOSH: 2ppm/1 hr. ceiling limit is the recommended exposure limit to waste anesthetic gas  
Internal: 50 ppm TWA (same TWA recommended by the ACGIH for Halothane, a similar inhalation anesthetic)

=====  
SECTION VI - HEALTH HAZARD DATA

First Aid

Inhalation: Remove to fresh air. If necessary give artificial respiration and seek medical help.

Skin: Wash immediately with soap and water.

Eye: Flush eyes out for at least 15 minutes with water. Seek medical help.

Oral: Induce vomiting if conscious. Seek medical help.

Medical Conditions Generally Aggravated by Exposure: Myocardial sensitization to epinephrine.

Other Health Hazards: None known

=====  
SECTION VII - PROTECTION INFORMATION

Respiratory: Self-contained breathing apparatus for emergency use

Ventilation: Adequate general and local ventilation

Eye and Face: Safety glasses or goggles and/or face shield

Gloves: Impervious gloves

Other equipment: Provide safety shower and eye wash facilities



=====  
SECTION VIII - SPILL, LEAK AND DISPOSAL PROCEDURES

Spill, Leak, or Release: Allow small spills to dissipate with good ventilation. For large spills wear self-contained breathing apparatus and absorb on vermiculite and place in closed container.

Waste Disposal: This material may be incinerated by licensed waste disposal company. Observe all federal, state & local regulations.

=====  
SECTION IX - OTHER INFORMATION

1. Hazardous Materials/Dangerous Goods Shipping Regulations

Anesthetics are classified as Dangerous Goods/Hazardous Materials when shipped by air. U.S. and international shipping regulations require that any person(s) shipping Dangerous Goods be properly trained and certified. Shipping Dangerous Goods without meeting these requirements is a violation of U.S. law and the shipper could be subject to fines and/or imprisonment. Anesthetics cannot be shipped by U.S. Mail.

U.S.  
(49 CFR): N/A (Regulated by Air Only)

IATA: Proper Shipping Name: Aviation Regulated Liquid, N.O.S.  
(1-Chloro-2,2,2-Trifluoroethyl Difluoromethyl Ether)  
Hazard Class: 9; ID No.: UN 3334  
Packaging Group: NA

IMDG: N/A (Regulated by Air Only)

2. Other Information: HMIS Labeling: H1; F 0; R0, PB

=====  
REVISED: JULY 7, 2003