Section 1 - Product and Company Information

Product Name  
2,2,2-TRIFLUOROETHANOL, 99.5+, NMR GRADE
Product Number  
326747
Brand  
SIAL
Company  
Sigma-Aldrich
Street Address  
3050 Spruce Street
City, State, Zip, Country  
SAINT LOUIS MO 63103 US
Technical Phone:  
314 771 5765
Emergency Phone:  
414 273 3850 Ext. 5996
Fax:  
800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name  
2,2,2-TRIFLUOROETHANOL
CAS #  
75-89-8
SARA 313  
No
Formula  
C2H3F3O
Synonyms  
TFE * 2,2,2-Trifluoroethanol *
beta,beta,beta-Trifluoroethyl alcohol *
2,2,2-Trifluoroethyl alcohol
RTECS Number:  
KM5250000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Flammable. Toxic (USA) Harmful (EU).
Harmful by inhalation, in contact with skin and if swallowed.
Irritating to respiratory system and skin. Risk of serious damage to eyes.

HMIS RATING
HEALTH: 2
FLAMMABILITY: 3
REACTIVITY: 1

NFPA RATING
HEALTH: 2
FLAMMABILITY: 3
REACTIVITY: 1

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give
artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLAMMABLE HAZARDS
Flammable Hazards: Yes

EXPLOSION HAZARDS
Vapor may travel considerable distance to source of ignition and flash back. Container explosion can occur under fire conditions. In advanced or massive fires the area should be evacuated and the fire should be fought from a remote explosion-resistant location.

FLASH POINT
84.2 °F  29 °C  Method: closed cup

EXPLOSION LIMITS
Lower: 5.5 %  Upper: 42 %

AUTOIGNITION TEMP
480 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Flammable liquid. Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors.
Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep container closed. Keep away from heat, sparks, and open flame. Store in a cool dry place. Store under inert gas.

SPECIAL REQUIREMENTS
Store under inert gas. Moisture sensitive.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Government approved respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling. Wash contaminated clothing before reuse.

Section 9 - Physical/Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>At Temperature or Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>100.04 AMU</td>
<td></td>
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<tr>
<td>pH</td>
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<tr>
<td>BP/BP Range</td>
<td>73.0 - 75.0 °C</td>
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<tr>
<td>MP/MP Range</td>
<td>- 43.5 °C</td>
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<tr>
<td>Freezing Point</td>
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<tr>
<td>Vapor Pressure</td>
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<td>25 °C</td>
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<td>Vapor Density</td>
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<tr>
<td>Saturated Vapor Conc.</td>
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<tr>
<td>SG/Density</td>
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<td></td>
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<tr>
<td>Bulk Density</td>
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</tr>
<tr>
<td>Odor Threshold</td>
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</tr>
<tr>
<td>Volatile%</td>
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<td></td>
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<tr>
<td>VOC Content</td>
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<td></td>
</tr>
<tr>
<td>Water Content</td>
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<td></td>
</tr>
<tr>
<td>Solvent Content</td>
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</tr>
<tr>
<td>Evaporation Rate</td>
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<tr>
<td>Viscosity</td>
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<tr>
<td>Surface Tension</td>
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<tr>
<td>Partition Coefficient</td>
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<tr>
<td>Decomposition Temp.</td>
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<tr>
<td>Flash Point</td>
<td>84.2 °F 29 °C</td>
<td>Method: closed cup</td>
</tr>
<tr>
<td>Explosion Limits</td>
<td>Lower: 5.5 %</td>
<td>Upper: 42 %</td>
</tr>
<tr>
<td>Flammability</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Autoignition Temp</td>
<td>480 °C</td>
<td></td>
</tr>
</tbody>
</table>
Section 10 - Stability and Reactivity

STABILITY

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen fluoride.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: Causes skin irritation. Skin Absorption: Harmful if absorbed through skin. Eye Contact: Causes severe eye irritation. Inhalation: Harmful if inhaled. Material is irritating to mucous membranes and upper respiratory tract. Ingestion: Harmful if swallowed.

SIGNS AND SYMPTOMS OF EXPOSURE
Pulmonary edema. Effects may be delayed. Exposure can cause: Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

TOXICITY DATA

Oral
Rat
240 mg/kg LD50

Inhalation
Rat

Skin
Rat
1680 mg/kg LD50

Intraperitoneal
Rat
210 MG/KG LD50
Oral
Mouse
366 mg/kg
LD50

Inhalation
Mouse
2,900 mg/m3
LC50
Remarks: Brain and Coverings: Changes in circulation (hemorrhage, thrombosis, etc.). Behavioral: General anesthetic. Lungs, Thorax, or Respiration: Structural or functional change in trachea or bronchi.

Intraperitoneal
Mouse
158 MG/KG
LD50
Remarks: Behavioral: Change in motor activity (specific assay).

Intravenous
Mouse
250 MG/KG
LD50
Remarks: Behavioral: Change in motor activity (specific assay).

Skin
Rabbit
390 UL/KG
LD50
Remarks: Skin and Appendages: Skin: After systemic exposure: Dermatitis, other

IRRITATION DATA

Skin
Rabbit
0.75 mg
24H
Remarks: Severe irritation effect

Eyes
Rabbit
20 mg
24H
Remarks: Moderate irritation effect

Eyes
Rabbit
100 mg
20S
Remarks: Rinsed

CHRONIC EXPOSURE - MUTAGEN

Mutation test: Histidine reversion (Ames)

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Species: Rat
Dose: 100 PPM/6H
Route of Application: Inhalation
Exposure Time: (14D MALE)
Result: Paternal Effects: Testes, epididymis, sperm duct.
Effects on Fertility: Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant females).

Species: Rat
Dose: 150 PPM/6H
Route of Application: Inhalation
Exposure Time: (4W MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Rat
Dose: 200 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (4D MALE)

Species: Dog
Dose: 400 MG/M3/6H
Route of Application: Inhalation
Exposure Time: (8W MALE)

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Time: 96 h
Value: 105.0 - 135.0 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Alcohols, flammable, toxic, n.o.s.
UN#: 1986
Class: 3
Packing Group: Packing Group III
Hazard Label: Flammable liquid
Hazard Label: Toxic substances.
PIH: Not PIH
IATA
Proper Shipping Name: Alcohols, flammable, toxic, n.o.s.
IATA UN Number: 1986
Hazard Class: 3
Packing Group: III

Section 15 - Regulatory Information

EU ADDITIONAL CLASSIFICATION
Symbol of Danger: Xn
Indication of Danger: Harmful.
R: 10-20/21/22-37/38-41
Risk Statements: Flammable. Harmful by inhalation, in contact with skin and if swallowed. Irritating to respiratory system and skin. Risk of serious damage to eyes.
S: 26-36-39
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing. Wear eye/face protection.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Flammable. Toxic (USA) Harmful (EU). Risk Statements: Harmful by inhalation, in contact with skin and if swallowed. Irritating to respiratory system and skin. Risk of serious damage to eyes. Safety Statements: Keep away from sources of ignition - no smoking. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2005 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.