Section 1 - Product and Company Information

Product Name: 1,1,2-TRICHLOROTRIFLUOROETHANE, STANDARD FOR GC
Product Number: 44705
Brand: FLUKA
Company: Sigma-Aldrich
Address: 3050 Spruce Street
          SAINT LOUIS MO 63103 US
Technical Phone: 800-325-5832
Fax: 800-325-5052
Emergency Phone: 314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name: 1,1,2-TRICHLOROTRIFLUOROETHANE
CAS #: 76-13-1
SARA 313: Yes

Formula: C2Cl3F3
Synonyms:
- Arcton 63
- Arklone P
- Asahifron 113
- CFC-113
- Chlorofluorocarbon 113
- Daiflon S 3
- F 113
- FC 113
- Fluorocarbon 113
- Freon 113
- Freon F113
- Freon TF
- Freon 113TR-T
- Frigen 113
- Frigen 113a
- Frigen 113TR
- Frigen 113TR-N
- Frigen 113 TR-T
- Genetron 113
- Halocarbon 113
- Isceon 113
- Kaiser chemicals 11
- Khladon 113
- Ledon 113
- R 113
- Racon 113
- Refrigerant 113
- Refrigerant R 113
- R 113 (Halocarbon)
- 1,1,2-Trichlorotrifluoroethane
- 1,2,2-Trichlorotrifluoroethane
- 1,1,2-Trichloro-1,2,2-trifluoroethane
  (ACGIH:OSHA)
- 1,1,2-Trifluorotrichloroethane
- 1,1,2-Trifluoro-1,2,2-trichloroethane

RTECS Number: KJ4000000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Dangerous for the environment.
Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Dangerous for the ozone layer.

HMIS RATING
- HEALTH: 0
- FLAMMABILITY: 0
- REACTIVITY: 0

NFPA RATING
- HEALTH: 0
- FLAMMABILITY: 0
- REACTIVITY: 0
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 breathing becomes difficult, call a physician.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

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

FLASH POINT
N/A

AUTOIGNITION TEMP
680 °C

FLAMMABILITY
N/A

extinguishing media
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

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

Section 6 - Accidental Release Measures

Methods for cleaning up
Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

Handling
User Exposure: Avoid inhalation. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

Storage
Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

Engineering Controls
Safety shower and eye bath. Mechanical exhaust required.
PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Respiratory protection is not required. Where protection is desired, use multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges.

Hand: Protective gloves.

Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>ACGIH</td>
<td>STEL</td>
<td>1250 PPM</td>
</tr>
<tr>
<td>USA</td>
<td>ACGIH</td>
<td>TWA</td>
<td>1000 PPM</td>
</tr>
<tr>
<td>USA</td>
<td>MSHA Standard-air</td>
<td>TWA</td>
<td>1000 PPM (7600 MG/M3)</td>
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<tr>
<td>USA</td>
<td>OSHA.</td>
<td>PEL</td>
<td>8H TWA 1000 PPM (7600 MG/M3)</td>
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<tr>
<td>New Zealand</td>
<td>OEL</td>
<td>Remarks: check ACGIH TLV</td>
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<tr>
<td>USA</td>
<td>NIOSH</td>
<td>TWA</td>
<td>1000 PPM</td>
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<tr>
<td></td>
<td></td>
<td>STEL</td>
<td>1250 PPM</td>
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Section 9 - Physical/Chemical Properties

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<th>Property</th>
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<th>At Temperature or Pressure</th>
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<tr>
<td>pH</td>
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<tr>
<td>BP/BP Range</td>
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<td>760 mmHg</td>
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<tr>
<td>MP/MP Range</td>
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<td>Freezing Point</td>
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<tr>
<td>Vapor Pressure</td>
<td>284.35 mmHg</td>
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<td>Vapor Density</td>
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<td>Saturated Vapor Conc.</td>
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<tr>
<td>SG/Density</td>
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<td>Bulk Density</td>
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<tr>
<td>Odor Threshold</td>
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<tr>
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<tr>
<td>VOC Content</td>
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<tr>
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<tr>
<td>Solvent Content</td>
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<tr>
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<td>Partition Coefficient</td>
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<td>Decomposition Temp.</td>
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<tr>
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<td>Explosion Limits</td>
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<td>Flammability</td>
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<tr>
<td>Solubility</td>
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</tbody>
</table>

N/A = not available

Section 10 - Stability and Reactivity
STABILITY
Stable: Stable.
Materials to Avoid: Finely powdered metals, Sodium, Aluminum, Potassium, Magnesium, Zinc.

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

SIGNS AND SYMPTOMS OF EXPOSURE
Prolonged exposure can cause: Narcotic effect.

TOXICITY DATA

Oral
Rat
43000 mg/kg
LD50
Gastrointestinal: Other changes. Skin and Appendages: Other: Hair.

Inhalation
Rat
38,500 ppm
LC50

Inhalation
Mouse
260,000 mg/m3
LC50

Intravenous
Mouse
9 GM/KG
LD50

Inhalation
Rabbit
59,500 ppm
LC50

Inhalation
Guinea pig
>12 PPH/2H
LC50

IRRITATION DATA

Skin
Rabbit
500 mg
Remarks: Open irritation test

Skin
Rabbit
500 mg
24H
Remarks: Mild irritation effect

CHRONIC EXPOSURE - CARCINOGEN
Result: This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

ACGIH CARCINOGEN LIST
Rating: A4

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rabbit
Dose: 5 GM/KG
Route of Application: Oral
Exposure Time: (8D PREG)

Section 12 - Ecological Information
N/A

ACUTE ECOTOXICITY TESTS
Test Type: LC50 Fish
Species: Brachydanio rerio
Time: 96 h
Value: 7.0 - 14.0 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 48 h
Value: 71 mg/l

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Value: 11.7 mg/l

ELIMINATION
Elimination: < 10 %
Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT

Proper Shipping Name: None
Non-Hazardous for Transport: This substance is considered to be non-hazardous for transport.

IATA

Proper Shipping Name: Environmentally hazardous substance, liquid, n.o.s.
IATA UN Number: 3082
Hazard Class: 9
Packing Group: III

Section 15 - Regulatory Information

EU ADDITIONAL CLASSIFICATION

Symbol of Danger: N
Indication of Danger: Dangerous for the environment.
R: 52/53-59
Risk Statements: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Dangerous for the ozone layer.
S: 59-61
Safety Statements: Refer to manufacturer/supplier for information on recovery/recycling. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Dangerous for the environment.
Risk Statements: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Dangerous for the ozone layer.
Safety Statements: Refer to manufacturer/supplier for information on recovery/recycling. Avoid release to the environment. Refer to special instructions/safety data sheets.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes
DEMINIMIS: 1 %
NOTES: This product is subject to SARA section 313 reporting requirements.
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.
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 2009 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.