GENETRON® 22
CHLORODIFLUOROMETHANE

PRODUCT SAFETY DATA SHEET

A. GENERAL INFORMATION

<table>
<thead>
<tr>
<th>TRADE NAME (COMMON NAME)</th>
<th>CAS NO.</th>
<th>ALLIED PRODUCT CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENETRON® 22 chlorodifluoromethane</td>
<td>75-45-6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHEMICAL NAME AND/OR SYNONYM</th>
<th>MOLECULAR WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorodifluoromethane</td>
<td>86.47</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FORMULA</th>
<th>ADDRESS (NO., STREET, CITY, STATE AND ZIP CODE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHCIF₂</td>
<td>Allied-Signal Inc.</td>
</tr>
<tr>
<td></td>
<td>Engineered Materials Sector</td>
</tr>
<tr>
<td></td>
<td>P.O. Box 1139R</td>
</tr>
<tr>
<td></td>
<td>Morristown, N.J. 07962-1139</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTACT</th>
<th>PHONE NUMBER</th>
<th>LAST ISSUE DATE</th>
<th>CURRENT ISSUE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Safety Department</td>
<td>(201) 455-4157</td>
<td>May, 1989</td>
<td>November, 1990</td>
</tr>
</tbody>
</table>

B. FIRST AID MEASURES

<table>
<thead>
<tr>
<th>INHALATION:</th>
<th>EMERGENCY PHONE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove immediately to fresh air. If breathing is stopped, give artificial respiration, preferably mouth-to-mouth. Use oxygen as required, provided a qualified operator is available. Do not give epinephrine (adrenaline).</td>
<td>(201) 455-2000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SKIN AND EYE CONTACT:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediately bathe (do not rub) any frostbite with lukewarm (not hot) water. In the absence of water, cover with soft wool or other suitable material. Contact a physician for any low temperature burns from liquid contact.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INGESTION:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>This is improbable due to the low (-40.8 °C) boiling point.</td>
<td></td>
</tr>
</tbody>
</table>

C. HAZARDS INFORMATION

<table>
<thead>
<tr>
<th>HEALTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>INHALATION:</td>
</tr>
<tr>
<td>This material is low in toxicity at concentrations as high as 4% (40,000 ppm). When oxygen levels in air are reduced to 12-14%, symptoms of asphyxiation may occur: loss of coordination, increased pulse rate, and deeper respiration. Narcotic effects have been seen at 200,000 ppm. For further discussion, see Section K, which covers possible cardiac effects.</td>
</tr>
</tbody>
</table>

| INGESTION: |
| Not applicable, since material is gaseous at normal temperature and pressure. |

| SKIN |
| Contact with liquid or escaping vapor can cause frostbite, indicated by pallor or redness, loss of sensation and swelling. |

| EYES |
| Same hazards as for skin. |

<table>
<thead>
<tr>
<th>PERMISSIBLE CONCENTRATION: AIR (SEE SECTION J)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA PEL: 1,000 ppm</td>
</tr>
<tr>
<td>ACGIH TLV: 1,000 ppm</td>
</tr>
</tbody>
</table>

| BIOLOGICAL |
| None Established. |

| UNUSUAL CHRONIC TOXICITY |
| See Section K. |
**C. HAZARDS (Cont.)**

**FIRE AND EXPLOSION**

<table>
<thead>
<tr>
<th>FLASH POINT</th>
<th>AUTO IGNITION TEMPERATURE</th>
<th>FLAMMABLE LIMITS IN AIR (% BY VOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-flammable</td>
<td>Not applicable</td>
<td>LOWER - NA</td>
</tr>
<tr>
<td>□ OPEN CUP</td>
<td>□ CLOSED CUP</td>
<td></td>
</tr>
</tbody>
</table>

**UNUSUAL FIRE AND EXPLOSION HAZARDS**

While not combustible itself, contact with certain metals and oxidizing materials (see Section G) may produce exothermic reactions or potential explosive combinations. See Section K: GENETRON 22/air mixtures under pressure; and Section G: toxic decomposition products.

**D. PRECAUTIONS/PROCEDURES**

**FIRE EXTINGUISHING AGENTS RECOMMENDED**

Any standard agent -- choose the one most suitable for surrounding fire. This material itself is not flammable.

**FIRE EXTINGUISHING AGENTS TO AVOID**

Not pertinent.

**SPECIAL FIRE FIGHTING PRECAUTIONS**

Although not flammable, when this material is in a fire, firefighters should wear self-contained, NIOSH-approved, breathing apparatus for protection against suffocation and possible toxic decomposition products. Use water spray to keep fire-exposed containers cool.

**VENTILATION**

Ventilation should be adequate to meet TLV requirements and minimize exposure should material be released into the atmosphere. Provide local exhaust at filling zones and where leakage is probable. Mechanical (General) ventilation is adequate for other operating areas and for storage areas.

**NORMAL HANDLING**

Do not breathe gas; avoid contact with eyes, skin and clothing. Do not puncture or drop cylinders or expose them to open flame or excessive heat. Use authorized containers only. Follow label instructions and observe standard safety precautions for handling cylinders of compressed gas -- Reference (d).

**STORAGE**

Store in a cool, dry, well-ventilated area away from heat, flame or combustibles. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. See Reference (d) for further details on storage.

**SPILL OR LEAK (ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT - SECTION B)**

Using a self-contained air supply and protection against frostbite, personnel should attempt to close valves or repair source of leak if without risk.

If a large quantity is released, evacuate personnel and allow to dissipate. (Note Sections C and K for health hazards involved with inhalation and contact exposure.)

**SPECIAL PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS**

**SIGNAL WORD - WARNING**

This product can cause death or serious personal injury if not handled properly. Follow OSHA regulations for compressed gases (29 CFR 1910.101) and Reference (d) for cylinder handling. If use in pressure testing is contemplated, it is imperative to follow limitation set forth in Section K.

**E. PERSONAL PROTECTIVE EQUIPMENT**

**RESPIRATORY PROTECTION**

None generally required for normally vented situations. For unusual situations, wear a supplied-air respirator or a self-contained breathing apparatus, NIOSH-approved. At high concentrations, add a full facepiece.

**EYES AND FACE**

Wear chemical safety goggles if there is any reasonable probability of contact with liquid. In this case, do not wear contact lenses.

**HANDS, ARMS, AND BODY**

Wear protective, impervious gloves with PVA outer layer (2nd choice: neoprene) in situations where leakage or handling of liquid is a possibility. Impervious shoes and clothing should also be worn where leakage is probable. Gloves, clothing and shoes should be thermally insulated to prevent freezing.

**OTHER CLOTHING AND EQUIPMENT**

Provide convenient water source for first-aid treatment in case of frostbite (see Section B).
### F. PHYSICAL DATA

**MATERIAL IS (AT NORMAL CONDITIONS):**

- □ LIQUID
- □ SOLID
- ☑ GAS

**APPEARANCE AND ODOR**

Colorless liquefied gas with faint ethereal odor at higher concentrations.

**BOILING POINT**

- -40.8 °C

**MELTING POINT**

- -160 °C

**SPECIFIC GRAVITY**

- (liquid) @ 21.1°C (pressurized)
  - 1.21

**VAPOR DENSITY**

- (AIR = 1)
  - 2.98

**SOLUBILITY IN WATER**

- (By Weight)
  - 0.3 @ 25°C and 1 atmosphere

**PH**

- Unknown but believed to be neutral.

**EVAPORATION RATE**

- (Butyl Acetate = 1)
- (Ether = 1)
- NA (gas)

**% VOLATILES BY VOLUME**

- (At 20°C)
  - 100

**VAPOR PRESSURE**

- (mm Hg at 20°C)
  - 136 psia @ 21.1°C (70°F)

### G. REACTIVITY DATA

**STABILITY**

- □ UNSTABLE
- ☑ STABLE

**CONDITIONS TO AVOID**

Flames, lighted cigarettes, hot spots, welding. Decomposes at high temperatures, yielding toxic gases.

**INCOMPATIBILITY (MATERIALS TO AVOID)**

1. Strong oxidants, including oxygen, greatly increase the risk of fire or explosion in case conditions should favor such.
2. Alkali metals, such as sodium: cause exothermic reaction.
3. Alkali earth metals, such as magnesium: cause exothermic reaction.
4. Freshly exposed aluminum surfaces, e.g., in mechanical devices, in grinding, abrasion, or comminution: cause exothermic reaction - Ref. (c).

**HAZARDOUS DECOMPOSITION PRODUCTS**

- Halogens, halogen acids, carbon dioxide, carbon monoxide, and possibly carbonyl halides such as phosgene.

**HAZARDOUS POLYMERIZATION**

- □ MAY OCCUR
- ☑ WILL NOT OCCUR

**CONDITIONS TO AVOID**

None known.

### H. HAZARDOUS INGREDIENTS (Mixtures Only)

<table>
<thead>
<tr>
<th>MATERIAL OR COMPONENT / C.A.S. #</th>
<th>WT.%</th>
<th>HAZARD DATA (SEE SECT. J)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT APPLICABLE.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I. ENVIRONMENTAL

DEGRADABILITY/AQUATIC TOXICITY
Degradability: No data found.
Aquatic Toxicity: TLm96: over 1000 ppm.

TLm96 = Lethal concentration, 50% kill (96 hours).

OCTANOL/WATER PARTITION COEFFICIENT
Unknown

EPA HAZARDOUS SUBSTANCES
(CLEAN WATER ACT SEC. 311) YES NO IF SO REPORTABLE QUANTITY: #

40 CFR 116-117

WASTE DISPOSAL METHODS (DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS)
Disposal of GENETRON® 22 chlorodifluoromethane may be subject to state and local regulations. Users should review their operations in terms of applicable state and local laws and regulations, then consult with appropriate regulatory agencies before discharging or disposing of waste material.

RCRA STATUS OF UNUSED MATERIAL IF DISCARDED
Not a "hazardous waste".

HAZARDOUS WASTE NUMBER: (IF APPLICABLE)
NA

40 CFR 261

J. REFERENCES

PERMISSIBLE CONCENTRATION REFERENCES

REGULATORY STANDARDS
D.O.T. CLASSIFICATION: Nonflammable gas
49 CFR 173


I.D. No.: UN1018

GENERAL
(a) NIOSH Registry (RTECS), 1981-82, Accession No. PA6390000.
(b) Belej, M.A. et al., Toxicology 2, (1974), 381-395.
(c) Brotherick, L., "Handbook of Reactive Chemical Hazards", 2nd ed., 1979, Butterworths, Boston.
(e) Reinhardt, C.F., as reported in ACGIH Documentation of TLV's, 4th edition.
(f) ICI, Mond Division (UK), April, 1981.

K. ADDITIONAL INFORMATION

SECTION C -- HAZARDS INFORMATION -- continued

Health - Inhalation (continued)
Published animal studies report this material reduces heart efficiency at concentrations of 25,000 ppm or more -- Ref. (b).
In addition, cardiac sensitization to epinephrine has been observed at concentrations of 50,000 ppm -- Ref. (e).
*Cardiac sensitization can cause death in animals and in man.

Health - Chronic
A 2-year inhalation study indicated a slight increase in salivary gland tumors (rat) at the highest level of exposure tested (50,000 ppm). There were no observable results in rats at exposure levels of 1000 ppm and 10,000 ppm, and none in mice at any dose level. No changes in the current TLV (1000 ppm) have been recommended as a result of this study -- Reg. (f).

Fire and Explosion - Unusual Fire and Explosion Hazards (continued):
Mixtures of GENETRON® 22 and air (or oxygen), under pressures of 200 psig or higher, have been observed to ignite and to burn, generating explosive pressures. Therefore, GENETRON® 22 / air mixtures should be depressurized and removed from refrigeration systems and piping before welding.

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ALLIED-SIGNAL INC.

ENVIRONMENTAL DATA SHEET

SUPPLEMENT TO PSDS: GENETRON® 22

CURRENT ISSUE DATE: 11-1990  PSDS #: 883

SARA -- TITLE III (40 CFR 300)

1. THIS PRODUCT CONTAINS THE FOLLOWING EXTREMELY HAZARDOUS SUBSTANCE(S) (SECTIONS 302 AND 304):

   COMPONENT        TPO (LBS.)   RQ (LBS.)
   None Listed      NA           NA

2. THIS PRODUCT CONTAINS THE FOLLOWING CERCLA HAZARDOUS SUBSTANCE(S) (SECTION 302 AND 304):

   COMPONENT        WT %       RQ (LBS.)
   None Listed      NA          NA

NOTE: THE INFORMATION PROVIDED IN SECTION 1 AND 2 IS REQUIRED FOR EMERGENCY RESPONSE REPORTING.

3. THIS PRODUCT HAS THE FOLLOWING HAZARDS (SECTIONS 311 AND 312):

   IMMEDIATE      YES    NO
   DELAYED        YES    NO
   FIRE           YES    NO
   PRESSURE       YES    NO
   REACTIVE       YES    NO

4. THIS PRODUCT CONTAINS THE FOLLOWING TOXIC CHEMICALS (SECTION 313):

   COMPONENT        CAS #     WT %
   None Listed      NA        NA

5. WARNING

DO NOT VENT TO THE ATMOSPHERE. TO COMPLY WITH PROVISIONS OF THE U.S. CLEAN AIR ACT, ANY RESIDUAL MUST BE RECOVERED.

CONTAINS GENETRON® 22, A HCFC, A SUBSTANCE WHICH HARM'S PUBLIC HEALTH AND ENVIRONMENT BY DESTROYING OZONE IN THE UPPER ATMOSPHERE. DESTRUCTION OF THE OZONE LAYER CAN LEAD TO INCREASED ULTRAVIOLET RADIATION WHICH, WITH EXCESS EXPOSURE TO SUNLIGHT, CAN LEAD TO AN INCREASE IN SKIN CANCER AND EYE CATARACTS.

FOR ADDITIONAL INFORMATION ON THE ABOVE CHEMICALS, SEE THE MATERIAL SAFETY DATA SHEET.

DATE: 03/16/92