SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Genetron® HP80 (R-402A)
MSDS Number   : 000000009892
Product Use Description : Refrigerant

Company : Honeywell International, Inc.
          101 Columbia Road
          Morristown, NJ 07962-1057

For more information call : 800-522-8001
                          (Monday-Friday, 9:00am-5:00pm)

In case of emergency call :
Medical: 1-800-498-5701 or +1-651-523-0309
          Transportation: 1-800-424-9300 or +1-703-527-3887
                          (24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview
Form : Liquefied gas
Color : colourless
Odor : weak

Hazard Summary : Warning! Container under pressure. This product is not flammable at ambient temperatures and atmospheric pressure. Gas reduces oxygen available for breathing. Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating. Inhalation may cause central nervous system effects. May cause cardiac arrhythmia. May cause drowsiness and dizziness. Do not breathe vapour. Irritating to eyes and skin. Avoid contact with skin, eyes and clothing. At higher temperatures, (>250°C), decomposition products may include hydrochloric acid (HCl), hydrofluoric acid (HF) and carbonyl halides. The ACGIH Threshold Limit Values (2007) for Hydrogen Fluoride are TLV-TWA 0.5 ppm and Ceiling Exposure Limit 2 ppm.

Potential Health Effects
Skin : Avoid skin contact with leaking liquid (danger of frostbite).
      May cause frostbite.
      Irritating to skin.
Eyes: Causes serious eye irritation. May cause frostbite.

Ingestion: Unlikely route of exposure. Effects due to ingestion may include: Gastrointestinal discomfort.

Inhalation: Gas reduces oxygen available for breathing. Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating. Inhalation may cause central nervous system effects. Vapours may cause drowsiness and dizziness.

Chronic Exposure: None known.

Carcinogenicity

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentafluoroethane</td>
<td>354-33-6</td>
<td>58.00 - 62.00 %</td>
</tr>
<tr>
<td>Chlorodifluoromethane</td>
<td>75-45-6</td>
<td>36.00 - 40.00 %</td>
</tr>
<tr>
<td>Propane</td>
<td>74-98-6</td>
<td>1.00 - 2.00 %</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST AID MEASURES

Inhalation: Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Use oxygen as required, provided a qualified operator is present. Call a physician. Do not give drugs from adrenaline-ephedrine group.

Skin contact: After contact with skin, wash immediately with plenty of water. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. If symptoms persist, call a physician.

Eye contact: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. If symptoms persist, call a physician.
Ingestion: Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Call a physician immediately.

Notes to physician:

Treatment: Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions. Treat frost-bitten areas as needed.

SECTION 5. FIRE-FIGHTING MEASURES

Flash point: not applicable

Lower explosion limit: None

Upper explosion limit: None

Suitable extinguishing media: The product is not flammable.
ASHRAE 34
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Specific hazards during fire fighting: Contents under pressure.
This product is not flammable at ambient temperatures and atmospheric pressure.
However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources.
Container may rupture on heating.
Cool closed containers exposed to fire with water spray.
Do not allow run-off from fire fighting to enter drains or water courses.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
In case of fire hazardous decomposition products may be produced such as:
Gaseous hydrogen chloride (HCl).
Hydrogen fluoride
Carbon monoxide
Carbon dioxide (CO2)
Carbonyl halides
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Special protective equipment for fire-fighters: In the event of fire and/or explosion do not breathe fumes. Wear self-contained breathing apparatus and protective suit. No unprotected exposed skin areas.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Wear personal protective equipment. Unprotected persons must be kept away. Remove all sources of ignition. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area. After release, disperses into the air. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Avoid accumulation of vapours in low areas. Unprotected personnel should not return until air has been tested and determined safe. Ensure that the oxygen content is \( \geq 19.5\% \).

Environmental precautions: Prevent further leakage or spillage if safe to do so. The product evaporates readily.

Methods for cleaning up: Ventilate the area.

SECTION 7. HANDLING AND STORAGE

Handling

Handling: Handle with care. Avoid inhalation of vapour or mist. Do not get in eyes, on skin, or on clothing. Wear personal protective equipment. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Follow all standard safety precautions for handling and use of compressed gas cylinders. Use authorized cylinders only. Protect cylinders from physical damage. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Do not remove screw cap until immediately ready for use. Always replace cap after use.
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Advice on protection against fire and explosion:
The product is not flammable. Can form a combustible mixture with air at pressures above atmospheric pressure.

Storage:
Requirements for storage areas and containers:
Pressurized container: Protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Keep containers tightly closed in a dry, cool and well-ventilated place. Storage rooms must be properly ventilated. Ensure adequate ventilation, especially in confined areas. Protect cylinders from physical damage.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective measures:
Do not breathe vapour. Avoid contact with skin, eyes and clothing. Ensure that eyewash stations and safety showers are close to the workstation location.

Engineering measures:
General room ventilation is adequate for storage and handling. Perform filling operations only at stations with exhaust ventilation facilities.

Eye protection:
Wear as appropriate: Safety glasses with side-shields. If splashes are likely to occur, wear: Goggles or face shield, giving complete protection to eyes.

Hand protection:

Skin and body protection:
Protective suit. Avoid skin contact with leaking liquid (danger of frostbite). Wear cold insulating gloves/face shield/eye protection.

Respiratory protection:
In case of insufficient ventilation wear suitable respiratory equipment. Wear a positive-pressure supplied-air respirator. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. For rescue and maintenance work in storage tanks use self-
Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. Avoid contact with skin, eyes and clothing. Remove and wash contaminated clothing before re-use. Keep working clothes separately.

Exposure Guidelines

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>Source</th>
<th>TWA</th>
<th>STEL</th>
<th>REL</th>
<th>TWA</th>
<th>STEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pentfluoroethane</td>
<td>354-33-6</td>
<td>WEEL</td>
<td>TWA</td>
<td>1,000 ppm</td>
<td>4,900 mg/m³</td>
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<tr>
<td></td>
<td></td>
<td>HONEYWELL</td>
<td>TWA</td>
<td>1,000 ppm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorodifluoromethane</td>
<td>75-45-6</td>
<td>ACGIH</td>
<td>TWA</td>
<td>1,000 ppm</td>
<td>1,250 ppm 4,375 mg/m³</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>NIOSH</td>
<td>STEL</td>
<td>1,000 ppm</td>
<td>3,500 mg/m³</td>
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<tr>
<td></td>
<td></td>
<td>NIOSH</td>
<td>REL</td>
<td>1,000 ppm</td>
<td>3,500 mg/m³</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>OSHA Z1A</td>
<td>TWA</td>
<td>1,000 ppm</td>
<td>3,500 mg/m³</td>
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<td></td>
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<tr>
<td>Propane</td>
<td>74-98-6</td>
<td>ACGIH</td>
<td>TWA</td>
<td>1,000 ppm</td>
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<tr>
<td></td>
<td></td>
<td>NIOSH</td>
<td>REL</td>
<td>1,000 ppm</td>
<td>1,800 mg/m³</td>
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<td></td>
<td>OSHA Z1</td>
<td>PEL</td>
<td>1,000 ppm</td>
<td>1,800 mg/m³</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>OSHA Z1A</td>
<td>TWA</td>
<td>1,000 ppm</td>
<td>1,800 mg/m³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form: Liquefied gas
Color: Colourless
Odor: Weak
pH: Neutral
Genetron® HP80 (R-402A)

Freezing point : no data available
Boiling point/boiling range : -49.2 ºC (-56.6 ºF)
Vapor pressure : 11,928 hPa
               at 21.1 ºC (70.0 ºF)
Vapor pressure : 26,883 hPa
               at 54.4 ºC (129.9 ºF)
Relative vapour density : 3.5
                         (Air = 1.0)
Density : 1.14 g/cm³
                   at 21.1 ºC (70.0 ºF)
Water solubility : no data available
Partition coefficient: n-octanol/water : log Pow: 1.48
Partition coefficient: n-octanol/water : log Pow: 1.08 - 1.13
Solubility in other solvents : no data available

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid : Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 ºC. Decomposes under high temperature. Some risk may be expected of corrosive and toxic decomposition products. Can form a combustible mixture with air at pressures above atmospheric pressure. Do not mix with oxygen or air above atmospheric pressure.

Materials to avoid : Finely divided aluminium
                   Potassium
                   Calcium
                   Powdered metals
                   Aluminium
                   Magnesium
                   Zinc

Hazardous decomposition products : In case of fire hazardous decomposition products may be produced such as:
                                   Gaseous hydrogen chloride (HCl).
                                   Hydrogen fluoride
                                   Carbonyl halides
                                   Carbon monoxide
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Carbon dioxide (CO2)

Thermal decomposition : >250 °C

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity
Pentafluoroethane : > 769000 ppm
                   Exposure time: 4 h
                   Species: rat

Chlorodifluoromethane : LC50: > 300000 ppm
                        Exposure time: 4 h
                        Species: rat

Propane : LC50: > 800000 ppm
           Exposure time: 15 min
           Species: rat

Sensitisation
Pentafluoroethane : Cardiac sensitization
                   Species: dogs
                   Note: No-observed-effect level
                         75 000 ppm
                         Lowest observable effect level
                         100 000 ppm

Chlorodifluoromethane : Cardiac sensitization
                        Species: dogs
                        Note: Chlorodifluoromethane (HCFC-22): Cardiac
                             sensitisation threshold (dog): 50000 ppm.

Repeated dose toxicity
Pentafluoroethane : Species: rat
                   Application Route: Inhalation
                   Exposure time: (4 Weeks)
                   NOEL: 50000 ppm
                   Subchronic toxicity

Chlorodifluoromethane : Species: rat
                        Application Route: Inhalation
                        Exposure time: Lifetime Exposure ()
                        NOEL: 10000 ppm
                        Lifetime exposure of male rats was associated with a small
                        increase in salivary gland fibrosarcomas.
Pentafluoroethane

Test Method: Ames test
Result: negative

Cell type: Human lymphocytes
Result: negative

Cell type: Chinese Hamster Ovary Cells
Result: negative

Teratogenicity

Pentafluoroethane: Species: rabbit
Application Route: Inhalation exposure
NOAEL, Teratog: 50,000 ppm
NOAEL, Maternal: 50,000 ppm
Note: Did not show teratogenic effects in animal experiments.

Species: rat
Application Route: Inhalation exposure
NOAEL, Teratog: 50,000 ppm
NOAEL, Maternal: 50,000 ppm
Note: Did not show teratogenic effects in animal experiments.

Further information: Note: Acute Health Hazard Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Irritating to eyes and skin. Rapid evaporation of the liquid may cause frostbite. May cause cardiac arrhythmia.

SECTION 12. ECOLOGICAL INFORMATION

Toxicity to fish
Chlorodifluoromethane: static test
LC50: 777 mg/l
Exposure time: 96 h
Species: Danio rerio (zebra fish)

Toxicity to daphnia and other aquatic invertebrates.
Chlorodifluoromethane: static test
EC50: 433 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
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Biodegradability
Pentfluoroethane : Result: Not readily biodegradable.
Value: 5%
Method: OECD 301 D

Further information on ecology
Additional ecological information : This product contains greenhouse gases which may contribute to global warming. Do NOT vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered.
This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82. Section 611 requires the following label text on all shipments of this product:
Warning: Contains Chlorodifluoromethane (HCFC-22), a substance which harms public health and environment by destroying ozone in the upper atmosphere.
Refer to sections 610 and 612 for list of acceptable and unacceptable uses for this product.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Information: Observe all Federal, State, and Local Environmental regulations.
Additional advice : This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

SECTION 14. TRANSPORT INFORMATION

DOT
UN/ID No. : UN 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(Pentfluoroethane, Chlorodifluoromethane, Propane)
Class : 2.2
Packing group
Hazard Labels : 2.2

IATA
UN/ID No. : UN 3163
Description of the goods : LIQUEFIED GAS, N.O.S.
(Pentfluoroethane, Chlorodifluoromethane, Propane)
Class : 2.2
Hazard Labels : 2.2
Packing instruction (cargo : 200
Genetron® HP80 (R-402A)

IMDG
- UN/ID No.: UN 3163
- Description of the goods: LIQUEFIED GAS, N.O.S.
  (PENTAFLUOROETHANE, CHLORODIFLUOROMETHANE, PROPANE)
- Class: 2.2
- Hazard Labels: 2.2
- EmS Number: F-C
- Marine pollutant: no

SECTION 15. REGULATORY INFORMATION

Inventories
- 1907/2006 (EU): This mixture contains only ingredients which have been subject to a pre-registration according to Regulation (EC) No. 1907/2006 (REACH).
- US. Toxic Substances Control Act: On TSCA Inventory
- Australia. Industrial Chemical (Notification and Assessment) Act: On the inventory, or in compliance with the inventory
- Japan. Kashin-Hou Law List: On the inventory, or in compliance with the inventory
- Japan. Industrial Safety & Health Law (ISHL) List: On the inventory, or in compliance with the inventory
- Korea. Existing Chemicals Inventory (KECI): On the inventory, or in compliance with the inventory
- Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act: On the inventory, or in compliance with the inventory
- China. Inventory of Existing Chemical Substances: On the inventory, or in compliance with the inventory
NZIOC - New Zealand: On the inventory, or in compliance with the inventory

National regulatory information

SARA 313 Components: Chlorodifluoromethane 75-45-6

SARA 311/312 Hazards: Acute Health Hazard
                          Sudden Release of Pressure Hazard

California Prop. 65: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Massachusetts RTK: Chlorodifluoromethane 75-45-6
                    Propane 74-98-6

New Jersey RTK: Chlorodifluoromethane 75-45-6
                 Pentafluoroethane 354-33-6
                 Propane 74-98-6

Pennsylvania RTK: Chlorodifluoromethane 75-45-6
                  Pentafluoroethane 354-33-6
                  Propane 74-98-6

WHMIS Classification: A
                      This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

Global warming potential: 2,040

Ozone depletion potential (ODP): 0.02
## Genetron® HP80 (R-402A)

<table>
<thead>
<tr>
<th>Hazard Type</th>
<th>Value 1</th>
<th>Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health hazard</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Flammability</td>
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<td>1</td>
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<tr>
<td>Physical Hazard</td>
<td>0</td>
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<tr>
<td>Instability</td>
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