Genetron® 408A

000000009895

Version 2.5 | Revision Date 04/03/2014 | Print Date 05/28/2015

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Genetron® 408A
MSDS Number	:	000000009895
Product Use Description	:	Refrigerant
Manufacturer or supplier's details	:	Honeywell International Inc. 101 Columbia Road Morristown, NJ 07962-1057
For more information call	:	800-522-8001 +1-973-455-6300 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701 or +1-303-389-1414**
	:	**Transportation (CHEMTREC): 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

Classification of the substance or mixture

Classification of the substance or mixture	:	Gases under pressure, Liquefied gas Simple Asphyxiant

GHS Label elements, including precautionary statements

Symbol(s) :

Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary statements : **Prevention:**
Use personal protective equipment as required.

Storage:
Protect from sunlight. Store in a well-ventilated place.

Hazards not otherwise classified : May cause eye and skin irritation.
May cause frostbite.
May cause cardiac arrhythmia.

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

Chemical nature : Mixture

Chemical Name	CAS-No.	Concentration
Chlorodifluoromethane	75-45-6	47.00%
1,1,1-Trifluoroethane	420-46-2	46.00%
Pentafluoroethane	354-33-6	7.00%

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. FIREFIGHTING MEASURES

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 firefighting	:	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

Special protective equipment for firefighters : 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.
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 >= 19.5%.

Environmental precautions : Prevent further leakage or spillage if safe to do so.
The product evapourates 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.
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 : Leather gloves
In case of contact through splashing:
Protective gloves
Neoprene gloves
Polyvinyl alcohol or nitrile- butyl-rubber gloves

Skin and body protection : 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-contained breathing apparatus.

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

Components	CAS-No.	Value	Control parameters	Update	Basis
Chlorodifluoromethane	75-45-6	TWA : time weighted average	(1,000 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values

Chlorodifluoromethane	75-45-6	STEL : Short term exposure limit	4,375 mg/m3 (1,250 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Chlorodifluoromethane	75-45-6	REL : Recommended exposure limit (REL):	3,500 mg/m3 (1,000 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Chlorodifluoromethane	75-45-6	TWA : time weighted average	3,500 mg/m3 (1,000 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)
1,1,1-Trifluoroethane	420-46-2	TWA : time weighted average	(1,000 ppm)		Honeywell:Limit established by Honeywell International Inc.
1,1,1-Trifluoroethane	420-46-2	TWA : time weighted average	3,400 mg/m3 (1,000 ppm)	2007	WEEL:US. AIHA Workplace Environmental Exposure Level (WEEL) Guides
Pentafluoroethane	354-33-6	TWA : time weighted average	4,900 mg/m3 (1,000 ppm)	2007	WEEL:US. AIHA Workplace Environmental Exposure Level (WEEL) Guides
Pentafluoroethane	354-33-6	TWA : time weighted average	(1,000 ppm)		Honeywell:Limit established by Honeywell International Inc.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	:	Liquefied gas
Color	:	colourless
Odor	:	weak
pH	:	Note: neutral
Melting point/freezing point	:	Note: no data available
Boiling point/boiling range	:	-44 °C
Flash point	:	Note: no data available
Evaporation rate	:	> 1 Method: Compared to CCl4.
Lower explosion limit	:	Note: None
Upper explosion limit	:	Note: None
Vapor pressure	:	9,604 hPa at 21.1 °C(70.0 °F) 22,904 hPa at 54.4 °C(129.9 °F)
Vapor density	:	3.25 Note: (Air = 1.0)
Density	:	1.06 g/cm3 at 21.1 °C
Water solubility	:	1.5 g/l

Ignition temperature	:	> 750 °C
Auto-ignition temperature	:	The lowest known value is: 750 °C
Decomposition temperature	:	> 250 °C
Global warming potential (GWP)	:	2,216
Ozone depletion potential (ODP)	:	0.03

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Hazardous polymerisation does not occur.
Conditions to avoid	:	Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. 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.
Incompatible 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). Gaseous hydrogen fluoride (HF).

Carbon monoxide
Carbon dioxide (CO2)
Carbonyl halides

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity

Chlorodifluoromethane	:	LC50: > 300000 ppm Exposure time: 4 h Species: rat
1,1,1-Trifluoroethane	:	LC50: > 540000 ppm Exposure time: 4 h Species: rat LC50: > 106 mg/l Exposure time: 4 h Species: rat
Pentafluoroethane	:	> 769000 ppm Exposure time: 4 h Species: rat

Sensitisation

Chlorodifluoromethane	:	Cardiac sensitization Species: dogs Note: Chlorodifluoromethane (HCFC-22): Cardiac sensitisation threshold (dog): 50000 ppm.
1,1,1-Trifluoroethane	:	Cardiac sensitization Species: dogs Note: 1,1,1,2-tetrafluoroethane (HFC-134a): Cardiac sensitisation threshold (dog): 80000 ppm.
Pentafluoroethane	:	Cardiac sensitization Species: dogs Note: No-observed-effect level 75 000 ppm Lowest observable effect level 100 000 ppm

Repeated dose 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.
1,1,1-Trifluoroethane	:	Species: rat Application Route: Inhalation Exposure time: (90 d) NOEL: 40000 ppm Subchronic toxicity
Pentafluoroethane	:	Species: rat Application Route: Inhalation Exposure time: (4 Weeks) NOEL: 50000 ppm Subchronic toxicity

Genotoxicity in vitro

1,1,1-Trifluoroethane	:	Test Method: Ames test Result: negative
Pentafluoroethane	:	Test Method: Ames test Result: negative
	:	Cell type: Human lymphocytes Result: negative
	:	Cell type: Human lymphocytes Result: negative
	:	Cell type: Chinese Hamster Ovary Cells Result: negative

Genotoxicity in vivo

1,1,1-Trifluoroethane	:	Species: mouse Cell type: Bone marrow Application Route: Inhalation Result: negative

Teratogenicity

1,1,1-Trifluoroethane : Species: rat
Application Route: Inhalation exposure
NOAEL,Teratog: 40,000 ppm
NOAEL,Maternal: 40,000 ppm
Note: Did not show teratogenic effects in animal experiments.

Species: rabbit
Application Route: Inhalation exposure
NOAEL,Teratog: 40,000 ppm
NOAEL,Maternal: 40,000 ppm
Note: Did not show teratogenic effects in animal experiments.

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: Chlorodifluoromethane (HCFC-22): Cardiac sensitisation threshold (dog): 50000 ppm. 1,1,1-trifluoroethane (HFC-143a): Not mutagenic in AMES Test. Ethane, pentafluoro- (HFC-125): Cardiac sensitisation threshold (dog): 75000 ppm. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Irritating to eyes and skin. Rapid evapouration of the liquid may cause frostbite. Avoid skin contact with leaking liquid (danger of 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)

Biodegradability

Pentafluoroethane	:	Result: Not readily biodegradable. Value: 5 % Method: OECD 301 D

Further information on ecology

Additional ecological information	:	Accumulation in aquatic organisms is unlikely. 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

Disposal methods	:	Observe all Federal, State, and Local Environmental regulations.
Note	:	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. (Chlorodifluoromethane, 1,1,1-Trifluoroethane, Pentafluoroethane)
	Class		2.2
	Packing group		
	Hazard Labels		2.2
IATA	UN/ID No.	:	UN 3163
	Description of the goods	:	LIQUEFIED GAS, N.O.S. (Chlorodifluoromethane, 1,1,1-Trifluoroethane, Pentafluoroethane)
	Class	:	2.2
	Hazard Labels	:	2.2
	Packing instruction (cargo aircraft)	:	200
	Packing instruction (passenger aircraft)	:	200
IMDG	UN/ID No.	:	UN 3163
	Description of the goods	:	LIQUEFIED GAS, N.O.S. (CHLORODIFLUOROMETHANE, 1,1,1-TRIFLUOROETHANE, PENTAFLUOROETHANE)
	Class	:	2.2
	Hazard Labels	:	2.2
	EmS Number	:	F-C, S-V
	Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

Inventories

US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	:	On the inventory, or in compliance with the inventory

Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	:	All components of this product are on the Canadian DSL.
Japan. Kashin-Hou Law List	:	On the inventory, or in compliance with the inventory
Korea. Toxic Chemical Control Law (TCCL) List	:	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
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	:	On the inventory, or in compliance with the inventory

National regulatory information

SARA 302 Components	:	SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components	:	The following components are subject to reporting levels established by SARA Title III, Section 313:
	:	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
New Jersey RTK	:	Chlorodifluoromethane	75-45-6
	:	1,1,1-Trifluoroethane	420-46-2
Pennsylvania RTK	:	Chlorodifluoromethane	75-45-6

WHMIS Classification : A: Compressed Gas
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 : 2,216

Ozone depletion potential (ODP) : 0.03

SECTION 16. OTHER INFORMATION

		HMIS III	NFPA
Health hazard	:	1	2
Flammability	:	1	1
Physical Hazard	:	0	
Instability	:		0

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.
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Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group