



A-GAS R11

A-Gas

Chemwatch Hazard Alert Code: 3

Chemwatch: 10644

Issue Date: 27/06/2017

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Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

L.GHS.USA.EN

SECTION 1 IDENTIFICATION

Product Identifier

Product name	A-GAS R11
Chemical Name	trichlorofluoromethane
Synonyms	C-Cl3-F; CFC13; CFC11; CFC-11; methane, trichlorofluoro-; fluorotrichloromethane; methane, fluorotrichloro-; monofluorotrichloromethane; trichloromonofluoromethane; Algofrene Type 1 Arcton 9 Electro-CF 11 Eskimon 11 F-11 FC-11; fluorocarbon No. 11 Freon-11 Freon-11A Freon-HE Freon-HF; Frigen-11 Genetron-11 Halocarbon-11 Isceon-131 Isotron-11; Ledon-11 NCI-C04637 Ucon Fluorocarbon-11 Ucon Refrigerant-11; Daiflon-S1
Proper shipping name	Environmentally hazardous substance, liquid, n.o.s. (contains A-Gas R11)
Chemical formula	CCl3F C-Cl3-F
Other means of identification	Not Available
CAS number	75-69-4

Recommended use of the chemical and restrictions on use

Relevant identified uses	General solvent; in fire extinguishers; as a blowing agent; aerosol propellant. Also used as a refrigerant, heat transfer medium and aerosol propellant for bronchodilators and corticosteroids in the treatment of bronchial asthma. Controlled ozone depleting gases: phase out by 1996 (C) Ozone depleting potential: 1.0/1.0 - Extreme. The Montreal Protocol on Substances that Deplete the Ozone Layer has ensured its general decline in terms of use.
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Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	A-Gas	A-Gas	Rapid Recovery part of A-Gas Group
Address	11050 South Highway 287 TX 76078 United States	1100 Haskins Rd OH 43402 United States	8932 WEST CACTUS ROAD ARIZONA 85381 United States
Telephone	817-636-2089	14198678990	877-372-7732
Fax	817.636.9007	1-419-867-3279	877-572-7732
Website	www.agasamericas.com	www.agasamericas.com	www.raprec.com
Email	tammy.myers@agas.com	tammy.myers@agas.com	ryan.olson@raprec.com

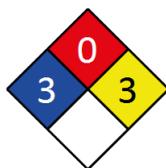
Emergency phone number

Association / Organisation	Chemtrec	PERS	PERS
Emergency telephone numbers	1-800-424-9300	1-800-633-8253	US 1-800-633-8253
Other emergency telephone numbers	Not Available	International 1-801-629-0667	International 1-801-629-0667

SECTION 2 HAZARD(S) IDENTIFICATION

Classification of the substance or mixture

NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

Classification	Acute Toxicity (Oral) Category 4, Acute Toxicity (Dermal) Category 4, Acute Toxicity (Inhalation) Category 2, Skin Corrosion/Irritation Category 2, Eye Irritation Category 2A, Specific target organ toxicity - single exposure Category 3 (respiratory tract irritation), Hazardous to the Ozone Layer Category 1
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Label elements

Hazard pictogram(s)	
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SIGNAL WORD	DANGER
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Hazard statement(s)

H302	Harmful if swallowed.
H312	Harmful in contact with skin.
H330	Fatal if inhaled.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H420	Harms public health and the environment by destroying ozone in the upper atmosphere.

Hazard(s) not otherwise specified

Not Applicable

Precautionary statement(s) Prevention

P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P271	Use only outdoors or in a well-ventilated area.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary statement(s) Response

P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P310	Immediately call a POISON CENTER or doctor/physician.
P362	Take off contaminated clothing and wash before reuse.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Precautionary statement(s) Storage

P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.

Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
P502	Refer to manufacturer/supplier for information on recovery/recycling.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

CAS No	%[weight]	Name
75-69-4	>99	<u>A-Gas R11</u>

Mixtures

See section above for composition of Substances

SECTION 4 FIRST-AID MEASURES

Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▶ Immediately hold eyelids apart and flush the eye continuously with running water. ▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. ▶ Transport to hospital or doctor without delay. ▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> ▶ Immediately remove all contaminated clothing, including footwear. ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation.
Inhalation	<ul style="list-style-type: none"> ▶ If fumes or combustion products are inhaled remove from contaminated area. ▶ Lay patient down. Keep warm and rested. ▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▶ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▶ Transport to hospital, or doctor, without delay.
Ingestion	<ul style="list-style-type: none"> ▶ IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. ▶ For advice, contact a Poisons Information Centre or a doctor. ▶ Urgent hospital treatment is likely to be needed. ▶ In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition. ▶ If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the SDS should be provided. Further action will be the responsibility of the medical specialist. ▶ If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the SDS. <p>Where medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:</p> <ul style="list-style-type: none"> ▶ INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. <p>NOTE: Wear a protective glove when inducing vomiting by mechanical means.</p> <ul style="list-style-type: none"> ▶ Avoid giving milk or oils. ▶ Avoid giving alcohol.

Most important symptoms and effects, both acute and delayed

See Section 11

Indication of any immediate medical attention and special treatment needed

As in all cases of suspected poisoning, follow the ABCDEs of emergency medicine (airway, breathing, circulation, disability, exposure), then the ABCDEs of toxicology (antidotes, basics, change absorption, change distribution, change elimination).

For poisons (where specific treatment regime is absent):

BASIC TREATMENT

- ▶ Establish a patent airway with suction where necessary.
- ▶ Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- ▶ Administer oxygen by non-rebreather mask at 10 to 15 L/min.
- ▶ Monitor and treat, where necessary, for pulmonary oedema.
- ▶ Monitor and treat, where necessary, for shock.
- ▶ Anticipate seizures.
- ▶ **DO NOT** use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

ADVANCED TREATMENT

- ▶ Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- ▶ Positive-pressure ventilation using a bag-valve mask might be of use.
- ▶ Monitor and treat, where necessary, for arrhythmias.
- ▶ Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.

Continued...

- ▶ Drug therapy should be considered for pulmonary oedema.
- ▶ Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.
- ▶ Treat seizures with diazepam.
- ▶ Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

for intoxication due to Freons/ Halons;

A: Emergency and Supportive Measures

- ▶ Maintain an open airway and assist ventilation if necessary
- ▶ Treat coma and arrhythmias if they occur. Avoid (adrenaline) epinephrine or other sympathomimetic amines that may precipitate ventricular arrhythmias. Tachyarrhythmias caused by increased myocardial sensitisation may be treated with propranolol, 1-2 mg IV or esmolol 25-100 microgm/kg/min IV.
- ▶ Monitor the ECG for 4-6 hours

B: Specific drugs and antidotes:

- ▶ There is no specific antidote

C: Decontamination

- ▶ Inhalation; remove victim from exposure, and give supplemental oxygen if available.
- ▶ Ingestion; (a) Prehospital: Administer activated charcoal, if available. **DO NOT** induce vomiting because of rapid absorption and the risk of abrupt onset CNS depression. (b) Hospital: Administer activated charcoal, although the efficacy of charcoal is unknown. Perform gastric lavage only if the ingestion was very large and recent (less than 30 minutes)

D: Enhanced elimination:

- ▶ There is no documented efficacy for diuresis, haemodialysis, haemoperfusion, or repeat-dose charcoal.

POISONING and DRUG OVERDOSE, Californian Poison Control System Ed. Kent R Olson; 3rd Edition

- ▶ Do not administer sympathomimetic drugs unless absolutely necessary as material may increase myocardial irritability.
- ▶ No specific antidote.
- ▶ Because rapid absorption may occur through lungs if aspirated and cause systematic effects, the decision of whether to induce vomiting or not should be made by an attending physician.
- ▶ If lavage is performed, suggest endotracheal and/or esophageal control.
- ▶ Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.
- ▶ Treatment based on judgment of the physician in response to reactions of the patient

DO NOT administer sympathomimetic drugs as they may cause ventricular arrhythmias.

SECTION 5 FIRE-FIGHTING MEASURES

Extinguishing media

- ▶ Foam.
- ▶ Dry chemical powder.
- ▶ BCF (where regulations permit).
- ▶ Carbon dioxide.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result
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Special protective equipment and precautions for fire-fighters

Fire Fighting	<ul style="list-style-type: none"> ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear breathing apparatus plus protective gloves in the event of a fire. ▶ Prevent, by any means available, spillage from entering drains or water courses. ▶ Use fire fighting procedures suitable for surrounding area.
Fire/Explosion Hazard	<ul style="list-style-type: none"> ▶ Non combustible. ▶ Not considered to be a significant fire risk. ▶ Heating may cause expansion or decomposition leading to violent rupture of containers. ▶ May emit corrosive, poisonous fumes. <p>Decomposes on heating and produces acrid and toxic fumes of:</p> <ul style="list-style-type: none"> , carbon dioxide (CO2) , hydrogen chloride , phosgene , hydrogen fluoride , other pyrolysis products typical of burning organic material. <p>Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.</p>

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	<p>Environmental hazard - contain spillage.</p> <ul style="list-style-type: none"> ▶ Clean up all spills immediately. ▶ Avoid breathing vapours and contact with skin and eyes. ▶ Control personal contact with the substance, by using protective equipment. ▶ Contain and absorb spill with sand, earth, inert material or vermiculite. 																																																																											
Major Spills	<p>Environmental hazard - contain spillage.</p> <ul style="list-style-type: none"> ▶ Clear area of personnel and move upwind. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear breathing apparatus plus protective gloves. ▶ Prevent, by any means available, spillage from entering drains or water course. <p>Chemical Class: aliphatics, halogenated</p> <p>For release onto land: recommended sorbents listed in order of priority.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">SORBENT TYPE</th> <th style="width: 10%;">RANK</th> <th style="width: 30%;">APPLICATION</th> <th style="width: 15%;">COLLECTION</th> <th style="width: 15%;">LIMITATIONS</th> </tr> </thead> <tbody> <tr> <td colspan="5">LAND SPILL - SMALL</td> </tr> <tr> <td>cross-linked polymer - particulate</td> <td style="text-align: center;">1</td> <td>shovel</td> <td>shovel</td> <td>R, W, SS</td> </tr> <tr> <td>cross-linked polymer - pillow</td> <td style="text-align: center;">1</td> <td>throw</td> <td>pitchfork</td> <td>R, DGC, RT</td> </tr> <tr> <td>wood fiber - pillow</td> <td style="text-align: center;">2</td> <td>throw</td> <td>pitchfork</td> <td>R, P, DGC, RT</td> </tr> <tr> <td>treated wood fibre - particulate</td> <td style="text-align: center;">2</td> <td>shovel</td> <td>shovel</td> <td>R, W, DGC</td> </tr> <tr> <td>sorbent clay - particulate</td> <td style="text-align: center;">3</td> <td>shovel</td> <td>shovel</td> <td>R, I, P</td> </tr> <tr> <td>foamed glass - pillow</td> <td style="text-align: center;">3</td> <td>throw</td> <td>pitchfork</td> <td>R, P, DGC, RT</td> </tr> <tr> <td colspan="5">LAND SPILL - MEDIUM</td> </tr> <tr> <td>cross-linked polymer - particulate</td> <td style="text-align: center;">1</td> <td>blower</td> <td>skid loader</td> <td>R,W, SS</td> </tr> <tr> <td>cross-linked polymer - pillow</td> <td style="text-align: center;">2</td> <td>throw</td> <td>skid loader</td> <td>R, DGC, RT</td> </tr> <tr> <td>sorbent clay - particulate</td> <td style="text-align: center;">3</td> <td>blower</td> <td>skid loader</td> <td>R, I, P</td> </tr> <tr> <td>polypropylene - particulate</td> <td style="text-align: center;">3</td> <td>blower</td> <td>skid loader</td> <td>W, SS, DGC</td> </tr> <tr> <td>foamed glass - pillow</td> <td style="text-align: center;">3</td> <td>throw</td> <td>skid loader</td> <td>R, P, DGC, RT</td> </tr> <tr> <td>expanded mineral - particulate</td> <td style="text-align: center;">4</td> <td>blower</td> <td>skid loader</td> <td>R, I, W, P, DGC</td> </tr> </tbody> </table> <p>Legend DGC: Not effective where ground cover is dense R; Not reusable I: Not incinerable P: Effectiveness reduced when rainy RT: Not effective where terrain is rugged SS: Not for use within environmentally sensitive sites W: Effectiveness reduced when windy Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control; R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988</p>	SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS	LAND SPILL - SMALL					cross-linked polymer - particulate	1	shovel	shovel	R, W, SS	cross-linked polymer - pillow	1	throw	pitchfork	R, DGC, RT	wood fiber - pillow	2	throw	pitchfork	R, P, DGC, RT	treated wood fibre - particulate	2	shovel	shovel	R, W, DGC	sorbent clay - particulate	3	shovel	shovel	R, I, P	foamed glass - pillow	3	throw	pitchfork	R, P, DGC, RT	LAND SPILL - MEDIUM					cross-linked polymer - particulate	1	blower	skid loader	R,W, SS	cross-linked polymer - pillow	2	throw	skid loader	R, DGC, RT	sorbent clay - particulate	3	blower	skid loader	R, I, P	polypropylene - particulate	3	blower	skid loader	W, SS, DGC	foamed glass - pillow	3	throw	skid loader	R, P, DGC, RT	expanded mineral - particulate	4	blower	skid loader	R, I, W, P, DGC
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Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	<p>Contains low boiling substance:</p> <p>Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.</p> <ul style="list-style-type: none"> ▶ Check for bulging containers. ▶ Vent periodically ▶ Always release caps or seals slowly to ensure slow dissipation of vapours ▶ DO NOT allow clothing wet with material to stay in contact with skin ▶ Avoid all personal contact, including inhalation. ▶ Wear protective clothing when risk of exposure occurs. ▶ Use in a well-ventilated area.
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	<ul style="list-style-type: none"> ▶ Avoid contact with moisture.
Other information	<ul style="list-style-type: none"> ▶ Store in original containers. ▶ Keep containers securely sealed. ▶ Store in a cool, dry, well-ventilated area. ▶ Store away from incompatible materials and foodstuff containers.

Conditions for safe storage, including any incompatibilities

Suitable container	<ul style="list-style-type: none"> ▶ DO NOT use aluminium or galvanised containers ▶ Glass container is suitable for laboratory quantities ▶ Polyethylene or polypropylene container. ▶ Packing as recommended by manufacturer. ▶ Check all containers are clearly labelled and free from leaks.
Storage incompatibility	<p>Trichlorofluoromethane:</p> <ul style="list-style-type: none"> ▶ reacts violently with barium, alkali amides, alkali metals, metal powders, sodium, and potassium, molten aluminium or magnesium ▶ undergoes thermal decomposition when exposed to hot surfaces or fire, forming chlorine, hydrogen fluoride or chloride, phosgene and carbonyl fluoride ▶ slowly decomposes on contact with water ▶ attacks some plastics, rubbers and coatings ▶ attacks aluminium, copper, magnesium, tin and zinc ▶ Contact with acids produces toxic fumes ▶ CFCs may react with strong oxidising or reducing agents. <p>Haloalkanes:</p> <ul style="list-style-type: none"> ▶ are highly reactive:some of the more lightly substituted lower members are highly flammable; the more highly substituted may be used as fire suppressants, not always with the anticipated results. ▶ may react with the lighter divalent metals to produce more reactive compounds analogous to Grignard reagents. ▶ may produce explosive compounds following prolonged contact with metallic or other azides ▶ may react on contact with potassium or its alloys - although apparently stable on contact with a wide range of halocarbons, reaction products may be shock-sensitive and may explode with great violence on light impact; severity generally increases with the degree of halocarbon substitution and potassium-sodium alloys give extremely sensitive mixtures . <p>BREITHERICK L.: Handbook of Reactive Chemical Hazards</p> <ul style="list-style-type: none"> ▶ react with metal halides and active metals, eg. sodium (Na), potassium (K), lithium (Li),calcium (Ca), zinc (Zn), powdered aluminium (Al) and aluminium alloys, magnesium (Mg) and magnesium alloys.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US NIOSH Recommended Exposure Limits (RELs)	A-Gas R11	Freon® 11, Monofluorotrichloromethane, Refrigerant 11, Trichlorofluoromethane, Trichloromonofluoromethane	Not Available	Not Available	5600 mg/m3 / 1000 ppm	Not Available
US ACGIH Threshold Limit Values (TLV)	A-Gas R11	Trichlorofluoromethane	Not Available	Not Available	1000 ppm	TLV® Basis: Card sens
US OSHA Permissible Exposure Levels (PELs) - Table Z1	A-Gas R11	Fluorotrichloromethane (Trichlorofluoromethane)	5600 mg/m3 / 1000 ppm	Not Available	Not Available	Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
A-Gas R11	Trichlorofluoromethane; (Fluorotrichloromethane; Freon 11)	140 ppm	1,500 ppm	10,000 ppm

Ingredient	Original IDLH	Revised IDLH
A-Gas R11	2000 ppm	Not Available

MATERIAL DATA

For trichlorofluoromethane (syn: fluorotrichloromethane)

Following inhalation of extremely high concentrations acute narcosis and death from respiratory depression have been reported. Instantaneous deaths have occurred following sensitisation of the heart to the arrhythmogenic actions of adrenaline. A no-observed-adverse-limit effect concentration has been reported in animals inhaling 1000 ppm for 24 hours/day for 90 days. This value should provide a substantial margin of safety to minimise the potential of systemic toxicity (including fluorosis) and incorporates a wide margin of safety to preclude the danger of acute cardiac sensitisation.

Exposed individuals are reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odour Safety Factor (OSF) is determined to fall into either Class A or B.

The Odour Safety Factor (OSF) is defined as:

OSF= Exposure Standard (TWA) ppm/ Odour Threshold Value (OTV) ppm

Classification into classes follows:

Continued...

Class/OSF Description

A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV-TWA for example) is being reached, even when distracted by working activities
B	26-550As	"A" for 50-90% of persons being distracted
1-26	As "A"	for less than 50% of persons being distracted
D	0.18-1	10-50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	As "D" for less than 10% of persons aware of being tested

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.
Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▶ Safety glasses with side shields. ▶ Chemical goggles. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.
Skin protection	See Hand protection below
Hands/feet protection	<ul style="list-style-type: none"> ▶ Wear chemical protective gloves, e.g. PVC. ▶ Wear safety footwear or safety gumboots, e.g. Rubber Personal hygiene is a key element of effective hand care.
Body protection	See Other protection below
Other protection	<ul style="list-style-type: none"> ▶ Overalls. ▶ P.V.C. apron. ▶ Barrier cream.
Thermal hazards	Not Available

Respiratory protection

Type AX Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.

Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 5 x ES	Air-line*	AX-2	AX-PAPR-2 ^
up to 10 x ES	-	AX-3	-
10+ x ES	-	Air-line**	-

* - Continuous Flow; ** - Continuous-flow or positive pressure demand

^ - Full-face

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO₂), G = Agricultural chemicals, K = Ammonia(NH₃), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content. The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Colourless, volatile liquid with faint ethereal odour. Practically insoluble in water. Soluble in alcohol, ether and most organic solvents.		
Physical state	Liquid	Relative density (Water = 1)	1.49 @ 17.2 C
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Applicable
pH (as supplied)	Not Applicable	Decomposition temperature	Not available.

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Melting point / freezing point (°C)	-111.0	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	23.7	Molecular weight (g/mol)	137.36
Flash point (°C)	Not Applicable	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Applicable	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Applicable	Volatile Component (%vol)	100
Vapour pressure (kPa)	92 @ 20 C	Gas group	Not Available
Solubility in water (g/L)	Partly miscible	pH as a solution (1%)	Not Applicable
Vapour density (Air = 1)	5.85	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▶ Presence of heat source ▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable. ▶ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	<p>Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may produce toxic effects. Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.</p> <p>Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.</p> <p>When two men and one woman inhaled trichlorofluoromethane for 150 to 264 minutes at concentrations corresponding to total absorbed doses of 1.08, 1.88 and 1.35 g respectively, circulating concentrations ranged from 2.42-3.45 ppm. Volunteers exposed at concentrations of 250, 500 or 1000 ppm for periods of 1 minute to 8 hours or for 8 hours/day, 5 days/week for 2 to 4 weeks at concentrations of 1000 ppm, did not exhibit untoward physiological effects as determined by biological end-points including clinical haematology and chemistry, electrocardiogram, electroencephalogram, neurological parameters, pulmonary function and cognitive tests.</p> <p>Acute intoxication by halogenated aliphatic hydrocarbons appears to take place over two stages. Signs of a reversible narcosis are evident in the first stage and in the second stage signs of injury to organs may become evident, a single organ alone is (almost) never involved.</p> <p>Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. The vapour may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure.</p> <p>Depression of the central nervous system is the most outstanding effect of most halogenated aliphatic hydrocarbons. Inebriation and excitation, passing into narcosis, is a typical reaction. In severe acute exposures there is always a danger of death from respiratory failure or cardiac arrest due to a tendency to make the heart more susceptible to catecholamines (adrenalin)</p> <p>Exposure to high concentrations of fluorocarbons may produce cardiac arrhythmias or cardiac arrest due sensitisation of the heart to adrenalin or noradrenalin. Deaths associated with exposures to fluorocarbons (specifically halogenated aliphatics) have occurred in occupational settings and in inhalation of bronchodilator drugs.</p> <p>Bronchospasm consistently occurs in human subjects inhaling fluorocarbons. At a measured concentration of 1700 ppm of one of the commercially available aerosols there is a biphasic change in ventilatory capacity, the first reduction occurring within a few minutes and the second delayed up to 30 minutes.</p>
Ingestion	<p>Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.</p> <p> An acute oral dose of 2.5 ml/kg in paraffin produces neither fatalities nor hepatic necrosis in rats.</p>

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Skin Contact	<p>Skin contact with the material may be harmful; systemic effects may result following absorption.</p> <p>Evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.</p> <p>The material may accentuate any pre-existing dermatitis condition</p> <p>In common with other halogenated aliphatics, fluorocarbons may cause dermal problems due to a tendency to remove natural oils from the skin causing irritation and the development of dry, sensitive skin. They do not appear to be appreciably absorbed.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p>
Eye	<p>Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.</p> <p> Application of the liquid causes minor reversible irritation but no serious injury.</p>
Chronic	<p>Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.</p> <p>It is generally accepted that the fluorocarbons are less toxic than the corresponding halogenated aliphatic based on chlorine. Repeated inhalation exposure to the fluorocarbon FC-11 does not produce pathologic lesions of the liver and other visceral organs in experimental animals. There has been conjecture in non-scientific publications that fluorocarbons may cause leukemia, cancer, sterility and birth defects; these have not been verified by current research. The high incidence of cancer, spontaneous abortion and congenital anomalies amongst hospital personnel, repeatedly exposed to fluorine-containing general anaesthetics, has caused some scientists to call for a lowering of the fluorocarbon exposure standard to 5 ppm since some are mutagens.</p>

A-Gas R11	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">TOXICITY</td> <td style="text-align: center;">IRRITATION</td> </tr> <tr> <td style="text-align: center;">Inhalation (rat) LC50: 0.8115729375 mg/l/15M^[2]</td> <td style="text-align: center;">Not Available</td> </tr> </table>	TOXICITY	IRRITATION	Inhalation (rat) LC50: 0.8115729375 mg/l/15M ^[2]	Not Available
TOXICITY	IRRITATION				
Inhalation (rat) LC50: 0.8115729375 mg/l/15M ^[2]	Not Available				
Legend:	<p>1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. * Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances</p>				

A-GAS R11	<p>Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS.</p> <p>Chlorofluorocarbons may enter the human organism by inhalation, ingestion, or dermal contact. Inhalation is the most common and important route of entry, and exhalation is the most significant route of elimination from the body. Controlled studies with volunteer subjects and experimental animals have provided substantial data from exposures to a number of the chlorofluorocarbons. These data indicate that chlorofluorocarbons:</p> <ul style="list-style-type: none"> ▶ can be absorbed across the alveolar membrane, gastro- intestinal tract, or the skin; ▶ are absorbed rapidly into the blood, following inhalation; ▶ are absorbed into the blood at a decreasing rate as blood concentration increases; ▶ once in the blood, are absorbed by various tissues; ▶ will reach a stable blood level if exposure is sufficiently long, indicating an equilibrium between the air containing the chlorofluorocarbons and the blood; ▶ are still absorbed by body tissue, after the initial blood level stabilization, and continue to enter the body.
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Acute Toxicity	✔	Carcinogenicity	⊘
Skin Irritation/Corrosion	✔	Reproductivity	⊘
Serious Eye Damage/Irritation	✔	STOT - Single Exposure	✔
Respiratory or Skin sensitisation	⊘	STOT - Repeated Exposure	⊘
Mutagenicity	⊘	Aspiration Hazard	⊘

Legend: ✘ – Data available but does not fill the criteria for classification
✔ – Data available to make classification
⊘ – Data Not Available to make classification

A-GAS R11

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

A-Gas R11	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	EC50	48	Crustacea	=130mg/L	1
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data				

On the basis of the available evidence concerning properties and predicted or observed environmental fate and behavior, the material may present a danger to the structure and/or functioning of the stratospheric ozone layer.

For haloalkanes and haloalkenes:

Environmental fate:

Certain haloalkane gases in the atmosphere can also contribute to the greenhouse effect by restricting heat loss from the Earth's atmosphere through absorbing infrared emissions from the surface. Generally haloalkanes contributing to the greenhouse effect consist of a fully or partly fluorinated carbon backbone.

Gas-phase reactions with OH radicals are the major tropospheric loss process for the haloalkanes. In addition photooxidation reactions with O3 and NO3 radicals can result in transformation.

Following release of CFCs into the atmosphere, they eventually enter the troposphere where they persist undegraded. Subsequently they diffuse into the stratosphere and degrade slowly (half-lives of about 20 years). In the stratosphere, CFCs react slowly with oxygen free radicals and release chlorine atoms which catalytically destroy ozone producing irreversible damage. Use of CFCs has been restricted by the Montreal Protocol on Substances that Deplete the Ozone Layer (1988) and also by US EPA Regulation 3093/94.

DO NOT discharge into sewer or waterways.

|log Kow : 2.53| Half-life (hr) air : 52-207| Half-life (hr) H2O surface water : 4.3-6.1| Henrys atm m3 /mol: 0.97| Fish LC50 (96 h): 26-1000 mg/L

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
A-Gas R11	HIGH (Half-life = 720 days)	HIGH (Half-life = 54166.67 days)

Bioaccumulative potential

Ingredient	Bioaccumulation
A-Gas R11	LOW (BCF = 26)

Mobility in soil

Ingredient	Mobility
A-Gas R11	LOW (KOC = 48.64)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> ▶ Containers may still present a chemical hazard/ danger when empty. ▶ Return to supplier for reuse/ recycling if possible. <p>Otherwise:</p> <ul style="list-style-type: none"> ▶ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill. ▶ Where possible retain label warnings and SDS and observe all notices pertaining to the product. <p>Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.</p> <p>A Hierarchy of Controls seems to be common - the user should investigate:</p> <ul style="list-style-type: none"> ▶ Reduction ▶ Reuse ▶ Recycling ▶ Disposal (if all else fails) <p>This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use.</p> <ul style="list-style-type: none"> ▶ DO NOT allow wash water from cleaning or process equipment to enter drains. ▶ It may be necessary to collect all wash water for treatment before disposal. ▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▶ Where in doubt contact the responsible authority. ▶ Recycle wherever possible or consult manufacturer for recycling options. ▶ Consult State Land Waste Authority for disposal.
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- ▶ Bury or incinerate residue at an approved site.
- ▶ Recycle containers if possible, or dispose of in an authorised landfill.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO

Land transport (DOT)

UN number	3082	
UN proper shipping name	Environmentally hazardous substance, liquid, n.o.s. (contains A-Gas R11)	
Transport hazard class(es)	Class	9
	Subrisk	Not Applicable
Packing group	III	
Environmental hazard	Not Applicable	
Special precautions for user	Hazard Label	9
	Special provisions	8, 146, 173, 335, IB3, T4, TP1, TP29

Air transport (ICAO-IATA / DGR)

UN number	3082	
UN proper shipping name	Environmentally hazardous substance, liquid, n.o.s. * (contains A-Gas R11)	
Transport hazard class(es)	ICAO/IATA Class	9
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	9L
Packing group	III	
Environmental hazard	Not Applicable	
Special precautions for user	Special provisions	A97 A158 A197
	Cargo Only Packing Instructions	964
	Cargo Only Maximum Qty / Pack	450 L
	Passenger and Cargo Packing Instructions	964
	Passenger and Cargo Maximum Qty / Pack	450 L
	Passenger and Cargo Limited Quantity Packing Instructions	Y964
	Passenger and Cargo Limited Maximum Qty / Pack	30 kg G

Sea transport (IMDG-Code / GGVSee)

UN number	3082	
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (contains A-Gas R11)	
Transport hazard class(es)	IMDG Class	9
	IMDG Subrisk	Not Applicable
Packing group	III	
Environmental hazard	Not Applicable	
Special precautions for user	EMS Number	F-A, S-F
	Special provisions	274 335 969
	Limited Quantities	5 L

Transport in bulk according to Annex II of MARPOL and the IBC code

Continued...

A-GAS R11

Not Applicable

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

A-GAS R11(75-69-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

US - Alaska Limits for Air Contaminants	US - Washington Permissible exposure limits of air contaminants
US - California Permissible Exposure Limits for Chemical Contaminants	US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants
US - Hawaii Air Contaminant Limits	US ACGIH Threshold Limit Values (TLV)
US - Idaho - Limits for Air Contaminants	US ACGIH Threshold Limit Values (TLV) - Carcinogens
US - Massachusetts - Right To Know Listed Chemicals	US CWA (Clean Water Act) - Toxic Pollutants
US - Michigan Exposure Limits for Air Contaminants	US EPCRA Section 313 Chemical List
US - Minnesota Permissible Exposure Limits (PELs)	US List of Active Substances Exempt from the TSCA Inventory Notifications (Active-Inactive) Rule
US - Oregon Permissible Exposure Limits (Z-1)	US NIOSH Recommended Exposure Limits (RELs)
US - Pennsylvania - Hazardous Substance List	US OSHA Permissible Exposure Levels (PELs) - Table Z1
US - Rhode Island Hazardous Substance List	US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	US TSCA New Chemical Exposure Limits (NCEL)
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	

Federal Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SECTION 311/312 HAZARD CATEGORIES

Flammable (Gases, Aerosols, Liquids, or Solids)	No
Gas under pressure	No
Explosive	No
Self-heating	No
Pyrophoric (Liquid or Solid)	No
Pyrophoric Gas	No
Corrosive to metal	No
Oxidizer (Liquid, Solid or Gas)	No
Organic Peroxide	No
Self-reactive	No
In contact with water emits flammable gas	No
Combustible Dust	No
Carcinogenicity	No
Acute toxicity (any route of exposure)	Yes
Reproductive toxicity	No
Skin Corrosion or Irritation	Yes
Respiratory or Skin Sensitization	No
Serious eye damage or eye irritation	Yes
Specific target organ toxicity (single or repeated exposure)	No
Aspiration Hazard	No
Germ cell mutagenicity	No
Simple Asphyxiant	No

US. EPA CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES (40 CFR 302.4)

Name	Reportable Quantity in Pounds (lb)	Reportable Quantity in kg
Methane, trichlorofluoro-	5000	2270

State Regulations

US. CALIFORNIA PROPOSITION 65

None Reported

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (A-Gas R11)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	Y
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	<p>Y = All ingredients are on the inventory</p> <p>N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)</p>

SECTION 16 OTHER INFORMATION

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
 PC—STEL: Permissible Concentration-Short Term Exposure Limit
 IARC: International Agency for Research on Cancer
 ACGIH: American Conference of Governmental Industrial Hygienists
 STEL: Short Term Exposure Limit
 TEEL: Temporary Emergency Exposure Limit,
 IDLH: Immediately Dangerous to Life or Health Concentrations
 OSF: Odour Safety Factor
 NOAEL :No Observed Adverse Effect Level
 LOAEL: Lowest Observed Adverse Effect Level
 TLV: Threshold Limit Value
 LOD: Limit Of Detection
 OTV: Odour Threshold Value
 BCF: BioConcentration Factors
 BEI: Biological Exposure Index

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