

Safety Data Sheet (SDS)

1,1-Difluoroethane (R152a / HFC-152a)

CAS No.: 75-37-6 UN No.: 1030 Date of issue: Aug 29, 2026 Version: 1.0

1 Identification

1.1 Product identifier

Chemical name	1,1-Difluoroethane
Common names / synonyms	R152a, HFC-152a, Difluoroethane, Genetron 152a, Dymel 152a
CAS number	75-37-6
UN number	1030 (1,1-Difluoroethane, flammable liquefied gas)
Dangerous goods code	21017 (Class 2.1 Flammable gas)
Molecular formula	C ₂ H ₄ F ₂ (CH ₃ CHF ₂)
Molecular weight	66.05 g/mol
Recommended use	Refrigerant (mixture component, candidate alternative to R404A/R507A), aerosol propellant, polyurethane blowing agent, organic Rankine cycle working fluid, automotive air conditioning alternative candidate, etc.

1.2 Details of the supplier of the safety data sheet

Supplier name	Hangzhou Wula Chemical Co., Ltd.
Address	No. 7 Longtan Road, Yuhang District, Hangzhou, Zhejiang Province, China
Postal code	311100
Telephone	+86-571-87024025
Fax	+86-571-87024025
E-mail	safety@wulachem.cn

1.3 Emergency telephone number

National Chemical Emergency Hotline (China): +86-532-83889090 (24 hours)

Zhejiang Chemical Emergency Hotline: +86-571-88071797

2 Hazards identification

2.1 GHS classification

Hazard classification:

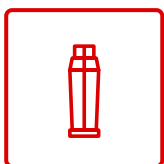
- Flammable gas (Physical hazard) — Category 1A
- Pressurized gas (Physical hazard) — Liquefied gas
- Specific target organ toxicity - single exposure (Health hazard, narcotic effect) — Category 3

Note: R152a is an ASHRAE A2-class (low toxicity, flammable) refrigerant. GWP is only 124, making it a candidate low-GWP environmentally friendly alternative. However, it is highly flammable (explosive limits 3.9%–16.9%), and strict fire and explosion prevention measures must be taken during use.

2.2 GHS label elements



GHS02 Flammable



GHS04 Gas cylinder



GHS07 Exclamation mark

Signal word: **DANGER**

Hazard statements:

- H220** Extremely flammable gas.
- H280** Contains gas under pressure; may explode if heated.
- H336** May cause drowsiness or dizziness.

Precautionary statements:

- P102** Read and understand all safety precautions before handling.
- P210** Keep away from heat/sparks/open flame/hot surfaces. No smoking.
- P271** Use only outdoors or in a well-ventilated area.
- P304+P340** IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P312** Call a POISON CENTER or doctor if you feel unwell.
- P377** Leaking gas fire: Do not extinguish, unless leak can be stopped safely; otherwise, evacuate area.
- P381** Eliminate all ignition sources.
- P403** Store in a well-ventilated place.

P410+P403 Protect from sunlight. Store in a well-ventilated place.

P405 Store locked up.

2.3 Other hazards

- Vapor is heavier than air (vapor density approximately 2.28 times that of air) and may spread long distances along the ground, finding an ignition source and flashing back.
- Extremely flammable; explosive limits 3.9%–16.9% by volume in air; wide explosion range, high hazard.
- Decomposes at high temperatures or contact with open flame, producing toxic and corrosive gases (hydrogen fluoride, carbon monoxide, carbonyl fluoride, etc.).
- Cylinders may rupture or burst when heated due to increased internal pressure.
- High-concentration exposure may cause cardiac arrhythmia (cardiac sensitization effect; NOAEL approximately 50,000 ppm).

3 Composition/information on ingredients

3.1 Substance/mixture

This product is a pure substance.

3.2 Composition information

Component name	CAS No.	Concentration (by mass)
1,1-Difluoroethane	75-37-6	≥99.5%

3.3 Impurity information

Impurity	Specification limit
Acidity (as HCl)	≤1 ppm
Moisture	≤10 ppm
Evaporation residue	≤100 ppm
Non-condensable gas	≤1.5%
Chloride	Pass

4 First aid measures

4.1 Description of necessary first aid measures

General advice: Remove victim from contaminated area immediately. Keep warm and at rest. Show this SDS to attending physician. Eliminate all ignition sources.

Inhalation:

- Move victim to fresh air immediately. Keep airway clear.
- Administer oxygen if breathing is difficult.
- If not breathing, give artificial respiration (preferably with bag-valve-mask or pocket mask; avoid mouth-to-mouth).
- If no pulse, start cardiopulmonary resuscitation (CPR) immediately.
- Keep victim warm and at rest. Monitor condition closely.
- Seek medical attention immediately.

Skin contact (frostbite):

- Immediately flush affected area with large amounts of lukewarm water (37–40°C) to promote rewarming.
- Do NOT use hot water (>40°C) or direct heat (e.g., electric heaters).
- Do NOT rub or massage frostbitten area; this may worsen tissue damage.
- Carefully remove frozen clothing. If clothing sticks to skin, do NOT pull it off; cut around it.
- Cover with sterile dressing.
- Seek medical attention immediately.

Eye contact:

- Immediately hold eyelids open and rinse thoroughly with plenty of water or normal saline for at least 15 minutes.
- Ensure complete irrigation of all eye surfaces by lifting upper and lower lids.
- Remove contact lenses if present and easily removable.
- Seek medical attention immediately, preferably from an ophthalmologist.

Ingestion:

Not applicable. This substance is a gas at ambient temperature; ingestion exposure is not expected.

4.2 Most important symptoms and effects, both acute and delayed

- Acute inhalation: dizziness, drowsiness, headache, nausea, ataxia, loss of consciousness, cardiac arrhythmia.
- Skin contact (liquid): frostbite (pale, hard skin, pain, blistering).
- Eye contact (liquid): severe frostbite, corneal damage, visual impairment.

4.3 Indication of any immediate medical attention and special treatment needed

Notes for physicians:

- Symptomatic and supportive therapy. Maintain airway; administer oxygen if needed.
- Monitor cardiac function; high-concentration exposure may cause arrhythmias.

- Avoid catecholamine drugs (e.g., epinephrine/adrenaline) — they may increase myocardial sensitivity to fluorocarbons and precipitate ventricular fibrillation.
- Treat frostbite with standard protocols: lukewarm water (37–40°C) rewarming. Do NOT use dry heat or massage.

5 Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media: Dry chemical, carbon dioxide. If the leaking gas cannot be safely stopped, allow the gas to burn and use water fog to cool the surrounding environment.

Unsuitable extinguishing media: Direct water stream (limited effectiveness on gas fires).

Note: If a gas leak catches fire and the leak cannot be safely stopped, do NOT extinguish the flame; otherwise, accumulated vapor may cause a larger explosion. Evacuate the area and let it burn while cooling surrounding containers.

5.2 Special hazards arising from the substance or mixture

- This substance is an extremely flammable gas; flash point -50°C , auto-ignition temperature 458°C , explosive limits 3.9%–16.9% by volume in air; wide explosion range.
- Vapor is heavier than air and may accumulate in low-lying areas, finding an ignition source and flashing back.
- Thermal decomposition at high temperatures produces toxic hydrogen fluoride, carbon monoxide, carbonyl fluoride, and other corrosive and harmful gases.
- Cylinders may rupture or burst when heated (BLEVE — Boiling Liquid Expanding Vapor Explosion).
- May react with alkali metals, alkaline earth metals, and aluminum powder under certain conditions.

5.3 Hazardous combustion products

Hydrogen fluoride (HF), carbon monoxide (CO), carbonyl fluoride (COF_2), and other fluorinated compounds.

5.4 Advice for firefighters

- Firefighters must wear positive-pressure self-contained breathing apparatus (SCBA) and full protective fire-resistant clothing.
- If possible, move containers from fire area to a safe location.
- Cool containers with water spray from a safe distance until fire is extinguished.
- Immediately evacuate if containers show discoloration or if pressure relief devices begin to vent.
- Isolate the area; keep unauthorized personnel out.
- If the leak cannot be stopped, evacuate the area, let it burn, and cool containers from a safe distance.

- Eliminate all ignition sources.

6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Evacuate personnel from the leak area to upwind locations immediately. Establish a perimeter and restrict access.
- Eliminate all ignition sources (open flame, electrical sparks, static electricity). Prohibit use of spark-generating tools.
- Emergency responders should wear positive-pressure SCBA, anti-static work clothing, protective gloves, and eye protection.
- Enter from upwind direction.
- Stop leak if it can be done safely.
- Do not touch or walk through spilled material.

6.2 Environmental precautions

- Prevent gas from entering sewers, basements, or confined spaces (explosion hazard).
- Ventilate the area to accelerate dispersion.
- Avoid release to atmosphere, waterways, or soil.

6.3 Methods and materials for containment and cleaning up

- **Small leak:** Increase ventilation to accelerate gas dispersion. Monitor combustible gas concentration and oxygen levels to prevent asphyxiation and explosion.
- **Large leak:**
 - Close source valve if safe to do so.
 - Recover using dedicated gas recovery equipment.
 - If recovery is not possible, allow to disperse under safe conditions with area ventilation maintained.
 - If possible, move leaking cylinder to a safe area.
- **Cylinder leak:** Move cylinder to a well-ventilated safe area and vent slowly. If valve cannot be closed, contact supplier for professional handling.

6.4 Reference

See Section 8 (Exposure controls/personal protection) and Section 13 (Disposal considerations).

Critical hazard: R152a vapor density is approximately 2.28 times that of air and will accumulate in low-lying and confined spaces, where vapor and air can form explosive mixtures (explosive limits 3.9%–16.9%). Always check combustible gas concentration and oxygen levels before entering confined spaces or low-lying areas, and use a buddy system.

7.1 Precautions for safe handling

- Handle in closed systems with adequate natural ventilation or local exhaust.
- Personnel must be specially trained and strictly follow operating procedures. Certified personnel only.
- Keep away from fire and heat sources. No smoking in work areas.
- Use explosion-proof ventilation systems and equipment. Prevent gas leakage into workplace atmosphere.
- Avoid contact with oxidizing agents and reactive metals.
- Handle cylinders carefully; do not drop, slide, roll, or bump cylinders.
- Equip area with leak emergency response equipment and appropriate fire extinguishing equipment.
- No eating or drinking in work areas.
- Wear insulated gloves and eye protection when handling liquid to prevent frostbite.
- All metal equipment must be properly grounded to prevent static electricity accumulation.
- Periodically inspect cylinders, valves, and piping for leaks.

7.2 Conditions for safe storage, including any incompatibilities

- Store in a cool, dry, well-ventilated flammable gas warehouse.
- Storage temperature should not exceed 30°C. Keep away from fire, heat sources, and direct sunlight.
- Store separately from oxidizers and reactive metals. Do not co-store with incompatible materials.
- Storage area should be equipped with leak emergency response equipment.
- Cylinders must be stored upright with valve caps and safety rings in place, properly secured to prevent falling.
- Use explosion-proof lighting and ventilation systems.
- Prohibit use of equipment and tools that can generate sparks.
- Post clear "No Open Flames" safety warning signs in storage areas.
- Implement two-person receiving/issuing and two-person custody system.
- Equip with appropriate types and quantities of fire extinguishing equipment.

7.3 Specific end uses

For industrial use only. Personnel must be professionally trained. R152a is primarily used as a mixture refrigerant component, aerosol propellant, and blowing agent. As a low-GWP (124) environmentally friendly alternative candidate, it may be used in automotive air conditioning and commercial refrigeration. Do not use for direct food contact, medical inhalation, or other unapproved applications.

8.1 Control parameters

China OEL (Occupational Exposure Limit)	No established legal limit. Recommended reference: AIHA WEEL 1000 ppm (TWA, 8 hr)
AIHA WEEL-TWA (USA)	1000 ppm (time-weighted average, 8-hour)
OSHA PEL-TWA (USA)	Not established
DFG MAK (Germany)	1000 ppm (reference value)
Biological limit value	Not established

Note: Per GBZ 2.1-2019, this substance is not currently listed in the Chinese OEL table. International standards are recommended as reference during operation. NOAEL is 50,000 ppm.

8.2 Exposure monitoring methods

Gas chromatography with flame ionization detection (GC-FID) or mass spectrometry (GC-MS), infrared spectroscopy, combustible gas detector.

8.3 Appropriate engineering controls

- Enclosed process design with general ventilation or local exhaust.
- Provide safety shower and eyewash station.
- Install combustible gas detection alarms in areas where large leaks may occur.
- Use explosion-proof electrical equipment and lighting.
- All metal equipment must be properly grounded to prevent static electricity accumulation.

8.4 Individual protection measures

Respiratory protection:

- Normal conditions (below exposure limit): no special protection required.
- Elevated concentrations: half-face respirator with organic vapor cartridge is recommended.
- High concentration or emergency rescue/evacuation: positive-pressure self-contained breathing apparatus (SCBA) must be worn.
- Check combustible gas concentration before entering confined spaces; wear SCBA if oxygen levels are insufficient.

Eye/face protection:

- Chemical safety goggles or face shield must be worn to prevent liquid splashes and vapor irritation.

Skin protection:

- Hand protection: anti-static gloves for general handling; cryogenic-insulated gloves for liquid contact.
- Body protection: anti-static work clothing; cold-resistant clothing for liquid contact.
- Other: no smoking in work areas; wear anti-static shoes; avoid high-concentration inhalation.

8.5 Hygiene measures

- Remove contaminated clothing and wash skin thoroughly after work.
- Maintain good personal hygiene.
- Ensure eyewash and emergency shower are available in the workplace.

9 Physical and chemical properties

9.1 Basic physical and chemical properties

Appearance and odor	Colorless gas with a faint ethereal odor; gaseous at ambient temperature and pressure; colorless transparent liquid under pressure
Odor threshold	Not available (faint ether-like odor)
pH	Not applicable (gas)
Melting point / Freezing point	−117 °C (−178.6 °F)
Boiling point / Boiling range (101.3 kPa)	−24 °C (−11.2 °F)
Flash point	−50 °C (−58 °F) (extremely flammable)
Evaporation rate	Not available
Flammability (gas)	Extremely flammable (Category 1A)
Explosive limits (upper/lower)	Lower 3.9% (vol) / Upper 16.9% (vol)
Vapor pressure (25°C)	430 kPa (saturated vapor pressure)
Vapor density (air = 1)	~2.28 (heavier than air)
Relative density (liquid, 25°C)	0.901 g/cm ³
Solubility	Slightly soluble in water; soluble in ethanol, ether, and other organic solvents
Octanol/water partition coefficient (log P)	~0.75 (estimated)
Auto-ignition temperature	458 °C (856.4 °F)
Decomposition temperature	>300 °C onset of thermal decomposition

Viscosity (gas, 25°C)	~9.3 $\mu\text{Pa}\cdot\text{s}$
Surface tension (liquid, 25°C)	~6.5 mN/m

9.2 Thermodynamic properties

Critical temperature	113.3 °C (235.9 °F)
Critical pressure	4520 kPa (4.52 MPa / 655.5 psia)
Critical density	0.365 g/cm ³
Heat of vaporization (at boiling point)	324 kJ/kg
Liquid specific heat (25°C)	1.68 kJ/(kg·°C)
Henry's Law constant (25°C)	$\sim 8.0 \times 10^{-1}$ mol/(m ³ ·Pa) (estimated)

9.3 Other safety data

ASHRAE safety group	A2 (low toxicity, flammable)
Ozone Depletion Potential (ODP)	0 (does not deplete ozone layer; see Section 12.6)
Global Warming Potential (GWP, 100-yr)	~124 (low GWP, environmentally friendly alternative; see Section 12.6)

10 Stability and reactivity

10.1 Reactivity

Chemically relatively stable under normal temperature and pressure, but highly flammable.

10.2 Chemical stability

Stable under normal conditions of temperature and pressure, but must be kept away from fire and heat sources.

10.3 Possibility of hazardous reactions

- Vapor and air can form explosive mixtures (explosive limits 3.9%–16.9%); ignition by open flame or high heat can cause fire and explosion.
- Thermal decomposition at high temperatures produces toxic hydrogen fluoride, carbon monoxide, and carbonyl fluoride.

- May react with alkali metals, alkaline earth metals, and aluminum powder under high temperature or specific conditions.
- May undergo vigorous reactions with strong oxidizing agents.

10.4 Conditions to avoid

High temperature, open flame, sparks, static electricity, direct heat sources, cylinder overpressure.

10.5 Incompatible materials

Reactive metals (sodium, potassium, calcium, aluminum powder, magnesium powder, etc.), strong oxidizing agents.

10.6 Hazardous decomposition products

Hydrogen fluoride (HF), carbon monoxide (CO), carbonyl fluoride (COF₂), and other fluorinated compounds.

10.7 Hazardous polymerization

Will not occur.

11 Toxicological information

11.1 Information on toxicological effects

Acute toxicity:

Rat inhalation LC ₅₀ (4 hr)	383,000 ppm (38.3% by volume)
Mouse inhalation LC ₅₀ (2 hr)	Not available
Rabbit dermal LD ₅₀	Not available (gaseous substance)

11.2 Skin irritation/corrosion

Liquid contact can cause frostbite (physical injury), but is not a chemical corrosive. GHS classification: no skin corrosion/irritation classification (physical frostbite only).

11.3 Eye irritation/corrosion

Liquid contact can cause severe frostbite and corneal damage. GHS classification: not separately classified (physical frostbite).

11.4 Respiratory or skin sensitization

No sensitization reported. Available animal test data and human epidemiology data show no sensitization effect.

11.5 Germ cell mutagenicity

In vitro and in vivo tests (Ames test, chromosome aberration test, mouse micronucleus test, etc.) show no mutagenic effect.

11.6 Carcinogenicity

Insufficient evidence for carcinogenicity.

- IARC (International Agency for Research on Cancer): Not listed
- ACGIH (American Conference of Governmental Industrial Hygienists): Category A4 (Not classifiable as a human carcinogen)
- EPA (U.S. Environmental Protection Agency): Not listed

11.7 Reproductive toxicity

Animal studies show no significant reproductive or developmental toxicity at or below the NOAEL (50,000 ppm). No human reproductive toxicity data available.

11.8 STOT-single exposure

- Narcotic effect (Category 3): Inhalation of high concentrations may cause central nervous system depression, manifested as dizziness, drowsiness, headache, and impaired consciousness.
- Cardiac effects: High-concentration exposure may cause cardiac arrhythmia, especially under stress or exercise (catecholamine sensitization).

11.9 STOT-repeated exposure

Repeated low-concentration exposure shows no significant target organ toxicity. Long-term animal inhalation studies (NOAEL 50,000 ppm) have not shown clear organ damage.

11.10 Aspiration hazard

Not expected to cause aspiration pneumonia in gaseous form. However, high-concentration inhalation can cause CNS depression and cardiac sensitization. Deliberate inhalation (abuse) may cause severe cardiac arrhythmia or even sudden death.

12 Ecological information

12.1 Ecotoxicity

Fish acute toxicity (LC ₅₀ , 96 hr)	> 100 mg/L (low toxicity to fish)
Daphnia acute toxicity (EC ₅₀ , 48 hr)	> 100 mg/L
Algae growth inhibition (EC ₅₀ , 72 hr)	> 100 mg/L
Bacterial toxicity	Not available

12.2 Persistence and degradability

- Atmospheric degradation: Primarily degraded by reaction with hydroxyl radicals; atmospheric lifetime ~1.5 years.
- Biodegradability: Poorly biodegradable (not readily degraded by microorganisms).
- Hydrolysis: Not readily hydrolyzed at ambient temperature.
- Photodegradation: Can be photochemically degraded in the atmosphere.

12.3 Bioaccumulative potential

$\log P \approx 0.75$. Low bioaccumulation potential (below the bioconcentration threshold of $\log P = 4.5$).

12.4 Mobility in soil

Highly volatile in gaseous form. Low water solubility. Relatively high mobility. Volatilizes readily to atmosphere when released to soil.

12.5 Results of PBT and vPvB assessment

Does not meet PBT (persistent, bioaccumulative, and toxic) / vPvB (very persistent and very bioaccumulative) criteria.

12.6 Other adverse effects

- **Ozone Depletion Potential (ODP):** 0 (does not deplete the ozone layer; HFC-class non-ODS substance)
- **Global Warming Potential (GWP, 100-year time horizon):** ~124 (relative to $\text{CO}_2 = 1$); classified as a low-GWP substance
- R152a is a candidate low-GWP (124) environmentally friendly alternative with relatively minor impact on global warming.
- Not a controlled ozone-depleting substance under the Montreal Protocol ($\text{ODP} = 0$); is an HFC-class greenhouse gas controlled under the Kigali Amendment, but with low GWP and relatively small reduction pressure.

13 Disposal considerations

13.1 Waste treatment methods

Product/residues:

- Do NOT release directly to atmosphere (greenhouse gas, though low GWP).
- Recovery and recycling (purification and reuse) is the preferred approach (recommended).
- If recovery is not feasible, dispose of through a licensed hazardous waste treatment facility.
- High-temperature incineration with alkaline scrubber for fluoride removal is an acceptable method.
- Prevent gas explosion during incineration by controlling feed rate and concentration.
- Do not discharge to sewers, waterways, or soil.

Contaminated packaging:

- Empty cylinders must be returned to supplier or a qualified facility for disposal. Do not discard or cut empty cylinders.
- Empty cylinders with residual pressure and flammable gas are managed as hazardous waste.

13.2 Special precautions for disposal

- Refer to national and local regulations before disposal (e.g., Solid Waste Pollution Prevention and Control Law, Hazardous Waste Storage Pollution Control Standards, etc.).
- Personnel should wear appropriate personal protective equipment (see Section 8).
- Ensure good ventilation and keep away from fire sources to prevent gas accumulation.
- Disposal must be performed by a qualified and licensed facility.
- Disposal records should be maintained.

14 Transport information

14.1 UN number

1030 (1,1-Difluoroethane, flammable liquefied gas)

14.2 UN proper shipping name

1,1-DIFLUOROETHANE

14.3 Transport hazard class(es)

Class 2.1 Flammable gas

14.4 Packing group

Not applicable (Class 2 gases are not assigned a packing group)

14.5 Packing mark / Hazard label

- Primary hazard label: Flammable gas (red, Class 2.1)
- Subsidiary hazard label: None

14.6 Methods and materials for containment and packaging

- Seamless steel cylinders. Cylinders must comply with GB 5099 (Seamless Steel Gas Cylinders) and other applicable national standards.
- Common package sizes: 200 g, 250 g, 300 g aerosol cans; 5 kg, 13.6 kg, 50 kg, 400 kg cylinders.
- Filling coefficient must not exceed 0.77 kg/L.
- Cylinder valve outlet thread direction: left-hand thread for flammable gases.

14.7 Special requirements for different modes of transport

Road transport:

- Vehicles must have hazardous cargo transport license.

- Cylinders must have valve caps and safety rings in place.
- Cylinders generally laid flat with valves pointing in same direction; do not stack crosswise. Height must not exceed vehicle guardrail.
- Transport during early morning/evening in summer to avoid direct sunlight.
- Follow designated routes; do not stop in residential or densely populated areas.
- Vehicle exhaust pipes must be fitted with spark arrestors.

Rail transport:

- Prohibit hump shunting (no free-roll classification).
- Transport in boxcars; cylinders upright or laid flat and secured.

Marine transport (IMDG Code):

- UN 1030, Class 2.1
- Marine pollutant: No
- Stowage category: D (on deck only, or enclosed transport device or under-deck stowage subject to special provisions)

Air transport (ICAO/IATA DGR):

- UN 1030, Class 2.1
- Flammable gas
- Forbidden on passenger aircraft; cargo aircraft only (subject to IATA quantity limits and packing instructions)

14.8 Special precautions for user

- Do not co-transport with oxidizers, reactive metals, or food/feed products.
- Vehicles must be equipped with appropriate fire extinguishing equipment and leak emergency response gear.
- Transport personnel must be specially trained and certified.
- Protect from sunlight, rain, and high temperature during transit.
- When stopping en route, stay away from fire, heat sources, and high-temperature areas.
- Exhaust pipes of vehicles carrying this product must be fitted with spark arrestors.
- Load and unload carefully to prevent damage to cylinders and fittings.
- Cylinders must be securely fastened during transport to prevent collision and tipping.

15 Regulatory information

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

China regulations:

- Regulations on the Safety Management of Hazardous Chemicals (State Council Decree No. 591): Safety management of hazardous chemical production, storage, use, distribution, and transport
- Catalog of Hazardous Chemicals (2015 edition): Listed
- Rules for Classification and Labelling of Chemicals (GB 30000 series): GHS classification and labelling standards
- Safety Data Sheet for Chemical Products — Content and Order of Sections (GB/T 16483-2008): SDS preparation standard
- Provisions on the Safe Use of Chemicals in the Workplace (Ministry of Labor Decree No. 423, 1996)
- Occupational Exposure Limits for Hazardous Agents in the Workplace — Part 1: Chemical Agents (GBZ 2.1-2019)
- Gas Cylinder Safety Technical Regulations (TSG 23-2021)
- Regulations on Road Transport of Dangerous Goods
- Work Safety Law of the People's Republic of China
- Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution (including greenhouse gas management)
- Law of the People's Republic of China on the Prevention and Control of Solid Waste Pollution (solid and hazardous waste management)
- Regulations on the Management of Ozone-Depleting Substances: Not a controlled substance (ODP = 0)

International regulations:

- **UN GHS (Globally Harmonized System of Classification and Labelling of Chemicals):** 8th revised edition
- **Montreal Protocol:** Not a controlled ozone-depleting substance (ODP = 0)
- **Montreal Protocol Kigali Amendment:** R152a is listed as an HFC controlled substance, but with low GWP (124), reduction pressure is relatively small
- **Kyoto Protocol / Paris Agreement:** Listed as greenhouse gas (HFC class), but with low GWP
- **EU REACH Regulation (EC 1907/2006):** Registered substance
- **EU CLP Regulation (EC 1272/2008):** Classification, labelling and packaging regulation
- **EU F-Gas Regulation (EC 517/2014):** Fluorinated greenhouse gas control regulation
- **US EPA SNAP Program:** Approved for aerosol propellant and certain refrigeration applications
- **US OSHA HCS 2012:** Hazard Communication Standard
- **US DOT 49 CFR:** Hazardous Materials Transportation Regulations
- **ADR/RID:** European Agreement concerning the International Carriage of Dangerous Goods by Road/Rail
- **IMDG Code:** International Maritime Dangerous Goods Code
- **IATA DGR:** International Air Transport Association Dangerous Goods Regulations

15.2 Chemical safety assessment

Chemical Safety Assessment has not been carried out for this substance in the context of this SDS. Users should conduct their own assessment based on specific use conditions.

16 Other information

16.1 References

- NIOSH Pocket Guide to Chemical Hazards
- NOAA CAMEO Chemicals Database
- PubChem Compound Database (CID 6345)
- ASHRAE Handbook - Refrigeration Systems and Applications
- IPCC Fifth Assessment Report (AR5) — GWP data source
- GB/T 16483-2008 (Content and order of sections in safety data sheet for chemical products)
- GB 30000 series (Rules for classification and labelling of chemicals)
- United Nations GHS (Globally Harmonized System of Classification and Labelling of Chemicals), 8th revised edition
- Montreal Protocol Kigali Amendment

16.2 Abbreviations

Abbreviation	Full term
SDS / MSDS	Safety Data Sheet / Material Safety Data Sheet
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
CAS	Chemical Abstracts Service (registry number)
UN	United Nations (dangerous goods number)
ODP	Ozone Depletion Potential
GWP	Global Warming Potential
LC ₅₀	Lethal Concentration, 50%
LD ₅₀	Lethal Dose, 50%
NOAEL	No Observed Adverse Effect Level
WEEL	Workplace Environmental Exposure Level
SCBA	Self-Contained Breathing Apparatus

PBT	Persistent, Bioaccumulative, and Toxic
HFC	Hydrofluorocarbon
BLEVE	Boiling Liquid Expanding Vapor Explosion

16.3 Disclaimer

This Safety Data Sheet (SDS) has been prepared in accordance with GB/T 16483-2008 and the UN GHS standard, and is intended to provide guidance on the safe use, handling, and disposal of this product. The information contained herein is based on publicly available chemical databases, technical literature, and national standards, and is believed to be accurate and complete as of the date of issuance. However, no warranty, express or implied, is made as to the absolute accuracy, completeness, or reliability of the information. Users should verify the applicability of the information for their specific use conditions and local regulatory requirements, and take necessary safety precautions. The information in this document may be updated as new research findings and regulatory changes become available; periodic review of the latest version is recommended.