www.bex.co.kr

Material Safety Data Sheet

(Under Article 41 of the Occupational Safety and Health Act provisions in the written data)

Applies to : the manufacturer of this product, customers, distributors, dealers, transporters, handlers, and administrators

SECTION 1.PRODUCT AND COMPANY IDENTIFICATION

1) Trade name — BW-100 Electronic Contact Cleaner (Aerosol)

2) Relevant identified uses of the substance or mixture and uses advised against

Application of the substance	Electric and electronic contact cleaning agent. Precision instrument cleaner. Semiconductor Cleaner
Restriction of the substance	Don't use for other purposes.

3) Details of the supplier of the safety data sheet

Manufacture/supplier	BEX Intercorporation Ltd. 7-15, Baumoe-ro 27-gil, Seocho-gu, Seoul, KOREA
Emergency telephone/fax	During normal opening times: TEL: +82-2-571-4040, FAX: +82-2-575-1336
Department	Tech & Production Dept.
E-mail	jelee@buhmwoo.com

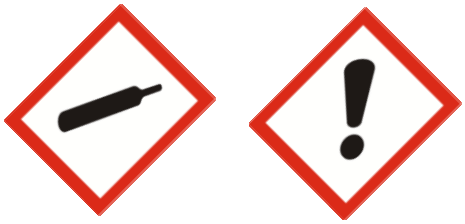
SECTION 2. HAZARDS IDENTIFICATION

1) CLASSIFICATION

High-pressure gas, Compressed gas
Serious eye damage or irritation : Category 2
Hamful to aquatic life with long lasting effects : Category 3

2) LABEL

Symbol



Signal Word — Warning

Hazard Statements

H280 Contains gas under pressure; may explode if heated
H319 Causes serious eye irritation
H412 Hamful to aquatic life with long lasting effects

Precautionary Statements

Prevention	P264 Wash skin thoroughly after handling. P273 Avoid release to the environment. P280 Wear protective gloves and eye / face protection.
Response	P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337+313 If eye irritation persist: Get medical advice / attention.
Storage	P410+P403 Protect from sunlight. Store in a well-ventilated place.
Disposal	P501 Dispose of contents and container in accordance with local regulations.

3) OTHER HAZARD INFORMATION

Name \ NFPA Code	HEALTH HAZARD	FIRE HAZARD	REACTIVITY
trans-1-Chloro-3,3,3-trifluoropropene	2	0	0
2,2,3,3,4,4,5 Heptafluorotetrahydro 5(nonafluorobutyl) furan	0	0	0
ISOPROPYL ALCOHOLHexadecafluoroheptane	0	0	0

NITROGEN	0	0	0

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

Name	Other Name	CAS#	Concentration(%)
trans-1-Chloro-3,3,3-trifluoropropene	HFO-1233zd	102687-65-0	70 ~ 80
2,2,3,3,4,4,5 Heptafluorotetrahydro 5(nonafluorobutyl) furan	-	335-36-4	5 ~ 10
Hexadecafluoroheptane	Perfluoroheptane	335-57-9	15 ~ 20
Nitrogen	-	7727-37-9	2 ~ 3

SECTION 4. FIRST AID MEASURES

1) EYE CONTACT
Flush with plenty of water to the bottom of the eyelids for at least 15 minutes.
Call a physician if irritation develops or if irritation persists.

2) SKIN CONTACT
In case of contact with skin, rinse immediately with plenty of water.
Wash skin with soap and water.
Avoid dispersal of the contaminated material in the presence of minor skin contact.
If symptoms persist, call a physician.
Remove all contaminated clothing immediately
Wash contaminated clothing before reuse.

3) INHALATION
Get emergency medical attention.
Keep it warm and stable.
Move to fresh air.
If not breathing, give artificial respiration.
If you have difficulty breathing, supply oxygen.
If you have a qualified worker, you can use oxygen if necessary.

4) INGESTION
Get emergency medical attention.
If the patient is conscious, let him drink a cup of water.
Do not induce vomiting without medical advice.
Never give anything by mouth to a person who has lost consciousness.
Get medical attention immediately.

5) NOTE TO PHYSICIAN
Understand material and treat appropriately.
IF exposed or concerned : Get medical advice/attention.

SECTION 5. FIRE FIGHTING MEASURES

1) EXTINGUISHING MEDIA : Non-flammable.
Use appropriate digestion methods for local and surrounding environments.
Appropriate Extinguishing Media : Water, Carbon dioxide, General foam
Inappropriate Extinguishing Media :
In case of large fire : Use regular extinguishing media.

2) SPECIFIC HAZARDS ARISING FROM THE CHEMICAL
This product is not subject to fire at room temperature and normal atmospheric pressure. However, this material may ignite when mixed with compressed air or exposed to a strong source of ignition. If heated, the container may burst.
Cool closed containers exposed to fire with water spray.
Do not let the drain from the digestion work flow into the sewer or drain.
Vapors are heavier than air and may cause suffocation.
Exposure to decomposition products may be harmful to your health.
Hydrogen fluoride
Gaseous Hydrogen Chloride(HCl)
Carbon monoxide(CO)
Carbon dioxide(CO_2)

Halogenated carbonyl

3) FIRE FIGHTING INSTRUCTIONS

In the event of fire or explosion, do not breathe fumes.
Wear self-contained breathing apparatus and protective clothing.
Wrap it completely to prevent skin exposure.

SECTION 6. ACCIDENTAL RELEASE MEASURES

1) PROTECTIVE MEASURES

Evacuate people to a safe place immediately.
Evacuate persons from spill or leaky materials in a windy direction.
Wear personal protective equipment. Prohibit access if you are not wearing protective equipment.
Remove all sources of ignition.
Let the ventilation.
Vapors are heavier than air, so reducing oxygen required for breathing may cause suffocation.
Avoid accumulation of steam in low places.
Anyone who does not wear protective equipment should not test the air until it is confirmed to be safe.
Make sure the oxygen content is less than 19.5%.

2) ENVIRONMENTAL PRECAUTIONS

It should not be released into the environment.
Do not discharge into surface water or sewage treatment facilities.
If safe, make sure there are no more leaks or spills.
Avoid spreading to large areas.

3) METHOD AND MATERIAL FOR CONTAINMENT AND CLEAN

Collect spillage with non-combustible absorbent material (sand, earth, diatomaceous earth, vermiculite, etc.) and dispose in accordance with local / regional regulations (see section 13).
Make a ditch far away from liquid leaks when leaking large quantities.

SECTION 7. HANDLING AND STORAGE

1) PRECAUTIONS FOR SAFE HANDLING

Handle with care.
Do not use where there is no adequate ventilation.
Do not inhale steam or spray mist.
Avoid exposure to sunlight and temperatures above 40℃.
Do not puncture, drop, or expose to flames or excessive heat.
Do not rupture or burn after use.
Do not spray flames or incandescent material.
Always close the lid after use.
You can generate flammable materials mixed with air at pressures higher than atmospheric pressure.
Keep product and empty containers away from heat and sources of ignition.

2) CONDITIONS FOR SAFE STORAGE

Avoid exposure to sunlight and temperatures above 40℃. Also, do not open or burn after use.
Keep container tightly closed and dry. Store in a cool, well-ventilated place.
Ensure adequate ventilation, especially in confined areas.
Protect the container from damage.
Store away from sources of mixed hazard.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

1) EXPOSURE LIMIT VALUES

1) trans-1-Chloro-3,3,3-trifluoropropene

DOMESTIC REGULATION	TWA : 800ppm
ACGIH	TWA : 800ppm
BIOLOGICAL LIMITS	No limit

2) 2,2,3,3,4,4,5 Heptafluorotetrahydro 5(nonafluorobutyl) furan

DOMESTIC REGULATION	Not determined
ACGIH	2.5mg/m3
OSHA PEL	2.5mg/m3
BIOLOGICAL LIMITS	No limit

3) Hexadecafluoroheptane

DOMESTIC REGULATION	Not determined
ACGIH	No limit
BIOLOGICAL LIMITS	No limit

4) Nitrogen

DOMESTIC REGULATION	Not determined
ACGIH	Not determined
BIOLOGICAL LIMITS	Not determined

2) ENGINEERING CONTROLS

Install a local ventilation system or ventilation system on process.
Charging should only be carried out in the area where there is exhaust ventilation.

3) PERSONAL PROTECTION

Respiratory Protection	If ventilation is inadequate, wear suitable respiratory equipment. Wear positive pressure air respirator. Use self-contained breathing apparatus for rescue operations and maintenance in storage tanks. Use a NOISH approved respirator.
Eye Protection	Do not wear contact lenses. Wear it properly. Wear safety goggles or face shields to protect your eyes.
Hand Protection	Wear impervious gloves. Gloves should be inspected before wearing. Replace if worn.
Skin and Body Protection	Use as appropriate: Solvent resistant gloves, solvent resistant aprons and boots. If you are concerned, do wear : Protective clothing
Precaution	Keep eye wash and safety showers close to the work area. Do not inhale steam or spray mist. Avoid contact with skin, eyes and clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

1) Appearance	Colorless liquid
2) Odour	Slightly
3) Odour threshold	Not determined
4) pH-value(3%)	Not applicable
5) Melting point	-90℃(an undiluted solution)
6) Initial boiling point/boiling range	19℃ / 19℃ ~ 115℃(an undiluted solution)
7) Flash point	Not applicable (ISO 2719)
8) Evaporation rate	0.9
9) Flammability (Solid, Gas)	Not applicable
10) Inginition or Explosion limits	This product is non-combustible.
11) Vapour pressure	1,516 hPa(30℃)
12) Solubility in water	1.9 g/L H2O(25℃)
13) Vapour density	Attention : (AIR = 1), Not determined
14) Specific gravity (25℃)	1.38(25℃)

15) N-Octanol/Water Distribution Coeff.	log Pow : 2.2(25℃)
16) Self ignition temperature	Not determined
17) Decomposition temperature	Not determined
18) Viscosity (㎟/s, 38℃)	Not determined
19) Molecular weight	Not determined for compound

SECTION 10. STABILITY AND REACTIVITY

1) STABILITY

2) POSSIBILITY OF HAZARD REACTIONS
Polymerization may occur.

3) CONDITIONS TO AVOID(electrostatic discharge, shock, vibration, etc.)
Protection from heat / overheating
Please keep away from direct sunlight.
Heat flame and spark
Do not mix with oxygen or higher than atmospheric pressure.

4) HAZARDOUS DECOMPOSITION PRODUCTS
In case of fire, the following harmful decomposition products may be generated.
Carbon monoxide, Carbon dioxide, Halogenated carbonyl, Gaseous hydrogen chloride, Gaseous hydrogen fluoride

SECTION 11. TOXICOLOGICAL INFORMATION

※ Product toxicity data is not exist. Each ingrediant data is filled as substitute.

1) INFORMATION ON THE LIKELY ROUTES OF EXPOSURE

Respiratory	Stimulation
Ingestion	Stimulation
Skin	Stimulation, Frostbite Concern
Eye	Stimulation

2) HEALTH HAZARDS

* The chemical name is too long to distinguish, components 1 to 4 as shown as below

Component 1.	trans-1-Chloro-3,3,3-trifluoropropene
Component 2.	2,2,3,3,4,4,5 Heptafluorotetrahydro 5(nonafluorobutyl) furan
Component 3.	Hexadecafluoroheptane
Component 4.	Nitrogen

Acute toxicity	Oral	ATEmix	Not determined
		Comp.1	Not determined
		Comp.2	Not determined
		Comp.3	Not determined
		Comp.4	Not determined
	Percutaneous	ATEmix	Not determined
		Comp.1	Not determined
		Comp.2	LD50>2,000 mg/kg(RAT)
		Comp.3	Not determined
		Comp.4	Not determined

Inhale	ATEmix > 114162 ppm	
	Comp.1	LD50 : 120,000 ppm(4hr, Mouse)
	Comp.2	LC50 > 31,660 ppm(RAT)
	Comp.3	LD50 : 215,000 mg/kg(Mouse)
	Comp.4	Not determined
Skin corrosive or irritation	Comp.1	Not classified as a skin irritant (Rabbit, OECD Test Guideline 404, 4hr)
	Comp.2	Could cause skin irritation
	Comp.3	Could cause skin irritation
	Comp.4	Skin, Eye and respiratory Irritations: Contact with liquid may cause frostbite & severe skin burns.
Serious eye damage or irritation	Comp.1	Not determined
	Comp.2	MLD/MOD = 1.000(estimation), With stimulation
	Comp.3	Prob. Of SEV Ocular Irritancy = 0.000
	Comp.4	Skin, Eye and respiratory Irritations: Contact with liquid may cause frostbite & severe skin burns.
Respiratory sensitization	Comp.1	Rat, Inhalation, 4 Weeks, NOEL: 4500 ppm, Note: Subacute toxicity
	Comp.2	No known symptoms
	Comp.3	No known symptoms
	Comp.4	Not determined
Skin sensitization	Comp.1	Does not cause skin irritation
	Comp.2	No known symptoms
	Comp.3	No known symptoms
	Comp.4	Not determined
Carcinogenicity	Comp.1	Not applicable(IARC)
	Comp.2	Not applicable(IARC)
	Comp.3	Not applicable(IARC)
	Comp.4	Not determined
Germ Cell Mutant	Comp.1	Negative (Salmorella, Mouse, Rat)
	Comp.2	Not applicable
	Comp.3	Not applicable
	Comp.4	Not determined
Reproductive toxicity	Comp.1	Maximal disincentive capacity (rabbit-15,000ppm, mouse -10,000ppm)
	Comp.2	Not applicable
	Comp.3	Not applicable
	Comp.4	Not determined
Target organ toxicity		
Single exposure	Comp.1	Not determined
	Comp.2	Not applicable
	Comp.3	Not applicable
	Comp.4	Liquids can cause frostbite
Repeated exposure	Comp.1	NOEL, Maximal disincentive capacity : 4,500 ppm, subacute toxicity (4 weeks, mouse, when inhaled)
	Comp.2	Not determined
	Comp.3	Not determined
	Comp.4	Not determined
Aspiration toxicity	Not determined	

SECTION 12. ECOLOGICAL INFORMATION

* Assort component 1 to 4 as written below because chemical names are too long.

Component 1. trans-1-Chloro-3,3,3-trifluoropropene
Component 2. 2,2,3,3,4,4,5 Heptafluorotetrahydro 5(nonafluorobutyl) furan
Component 3. Hexadecafluoroheptane
Component 4. Nitrogen

1) ECOTOXICITY	Comp.1	Toxicity to fish : LC50: 38 mg/L (Oncorhynchus mykiss (rainbow trout), 96h) Daphnia / Aquatic invertebrates : EC50: 82 mg/L(Daphnia magna (Water flea), 48h) Algae(growth inhibition) : EC50: 106.7 mg/L (Pseudokirchneriella subcapitata (green algae), 72h) Algae(growth rate) : EC50: 115 mg/l (Pseudokirchneriella subcapitata (green algae), 72h)
	Comp.2	Not applicable
	Comp.3	Not applicable
	Comp.4	Not determined
2) PERSISTENCE AND DEGRADABILITY	Comp.1	Not determined
	Comp.2	Not applicable
	Comp.3	Not applicable
	Comp.4	log Kow : 0.67
3) BIOACCUMULATION		
Bioaccumulation	Comp.1	Not determined
	Comp.2	log Pow > 3
	Comp.3	log Pow > 3
	Comp.4	Not determined
Biodegradation	Comp.1	Not biodegradable(0%)
	Comp.2	Not determined
	Comp.3	Not determined
	Comp.4	Not determined
4) SOIL MOBILITY	Comp.1	Not determined
	Comp.2	Not determined
	Comp.3	Not determined
	Comp.4	Not determined

5) OTHER ECOLOGICAL INFORAMTION

SECTION 13. DISPOSAL CONSIDERATIONS

1) DISPOSAL METHOD
Management by the Waste Management Act

2) PRECAUTIONS FOR DISPOSAL
Avoid direct contact

SECTION 14. TRANSPORT INFORMATION

1) UN NUMBER (UN NO.) UN 1950

2) PROPER SHIPPING NAME	AEROSOLS
3) HAZARD CLASS	2.2
4) PACKING GROUP	Not applicable
5) MARINE POLLUTANT	no
6) EMS NUMBER	Emergency measures[FIRE] : F-D Emergency measures[LEAK] : S-U

SECTION 15. REGULATORY INFORMATION

1) KOREA OCCUPATION SAFETY AND HE/	Not applicable
2) TCCA	Not applicable
3) DANGEROUS GOODS SAFETY MANAGE	Not applicable
4) WASTE MANAGEMENT ACTS	Not determined
5) OTHER NATIONAL AND FOREIGN LAW	
National law	Not determined
Foreign law	Not determined

SECTION 16. OTHER INFORMATION

1) SOURCE OF DATA	Buhmwoo Institute of Technology Research(Raw materials MSDS of supplier) Korea Occupational Safety and Health Agency Occupation Safety and Health Acts Wastes Control Act (ACT NO.4363) Toxic Chemicals Control Act Safety Control of Dangerous Substances Act
2) FIRST ISSUE DATE	2018. 07. 05
3) REVISION NO./FINAL REVISION DATE	
Revision No.	2
Revision Date	2022. 02. 10

4) OTHER INFORMATION

Comments listed in this MSDS is written based on our suppliers of raw materials and materials, and industrial Safety and Health Act to be up-to-date information, at this point I believe. However, the risk of hazardous substances is not written to all the risks of hazardous substances exist there may be unknown hazards of all chemicals in this material may be prescribed. Precautions carefully review this information, and our customers and potential customers, he should take a look, and need to check conformance with applicable laws and regulations relating to the use and disposal of this product. Be created only for the purpose of describing the product operator of health, safety and environmental requirements to ensure that the specific nature of the product, this material should be understood. Of this product in the actual our control, as it is impossible to take any responsibility for the result of the use of this material, can not be assumed that, in the final conformity assessment, please understand that only the user is responsible. Normal handling this material, so if special handling, use, and usage suitable for establishing safety measures must be. This material can be revised based on the new information, please see the instruction manual attached to the packaging of this product before using the product specification (the catalog) and also.