

**sec-Butyl Mercaptan**

Version 3.1

Revision Date 2018-08-28

SECTION 1: Identification of the substance/mixture and of the company/undertaking**Product information**

Product Name : sec-Butyl Mercaptan
Material : 1021484, 1021479, 1021493, 1021475, 1021476, 1021478, 1021480, 1021477

Use : Odorant, Chemical intermediate

Company : Chevron Phillips Chemical Company LP
Specialty Chemicals
10001 Six Pines Drive
The Woodlands, TX 77380

Emergency telephone:**Health:**

866.442.9628 (North America)

1.832.813.4984 (International)

Transport:

CHEMTREC 800.424.9300 or 703.527.3887(int'l)

Asia: CHEMWATCH (+612 9186 1132) China: 0532 8388 9090

EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)

Mexico CHEMTREC 01-800-681-9531 (24 hours)

South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600

Argentina: +(54)-1159839431

Responsible Department : Product Safety and Toxicology Group
E-mail address : SDS@CPChem.com
Website : www.CPChem.com

SECTION 2: Hazards identification**Classification of the substance or mixture**

This product has been classified in accordance with the hazard communication standard 29 CFR 1910.1200; the SDS and labels contain all the information as required by the standard.

Classification

: Flammable liquids, Category 2
Skin sensitization, Category 1

Labeling

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

Symbol(s)

:



Signal Word

:

Danger

Hazard Statements

:

H225: Highly flammable liquid and vapor.
H317: May cause an allergic skin reaction.

Precautionary Statements

:

Prevention:
 P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
 P233 Keep container tightly closed.
 P240 Ground/bond container and receiving equipment.
 P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
 P242 Use only non-sparking tools.
 P243 Take precautionary measures against static discharge.
 P261 Avoid breathing dust/fume/gas/mist/vapors/spray.
 P272 Contaminated work clothing should not be allowed out of the workplace.
 P280 Wear protective gloves/ eye protection/ face protection.
Response:
 P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
 P363 Wash contaminated clothing before reuse.
 P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
Storage:
 P403 + P235 Store in a well-ventilated place. Keep cool.
Disposal:
 P501 Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity:**IARC**

No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP

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

SECTION 3: Composition/information on ingredients

Synonyms

:

secondary Butyl mercaptan
1-methyl-1-propanethiol
Gas Odorant

Molecular formula

:

C₄H₁₀S

Component	CAS-No.	Weight %
sec-butyl Mercaptan	513-53-1	99
n-Butyl Mercaptan	109-79-5	1

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

SECTION 4: First aid measures

- General advice : Move out of dangerous area. Show this material safety data sheet to the doctor in attendance. Material may produce a serious, potentially fatal pneumonia if swallowed or vomited.
- If inhaled : If unconscious, place in recovery position and seek medical advice. If symptoms persist, call a physician.
- In case of skin contact : If on skin, rinse well with water. If on clothes, remove clothes.
- In case of eye contact : Flush eyes with water as a precaution. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.
- If swallowed : Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5: Firefighting measures

- Flash point : -23 °C (-9 °F)
estimated
- Autoignition temperature : No data available
- Suitable extinguishing media : Alcohol-resistant foam. Carbon dioxide (CO₂). Dry chemical.
- Unsuitable extinguishing media : High volume water jet.
- Specific hazards during fire fighting : Do not allow run-off from fire fighting to enter drains or water courses.
- Special protective equipment for fire-fighters : Wear self-contained breathing apparatus for firefighting if necessary.
- Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.
- Fire and explosion protection : Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.
- Hazardous decomposition products : Carbon oxides. Sulfur oxides.

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

SECTION 6: Accidental release measures

- Personal precautions : Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
- Environmental precautions : Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
- Methods for cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

SECTION 7: Handling and storage**Handling**

- Advice on safe handling : Avoid formation of aerosol. Do not breathe vapors/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations. Persons susceptible to skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
- Advice on protection against fire and explosion : Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

Storage

- Requirements for storage areas and containers : No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.
- Use : Odorant, Chemical intermediate

SECTION 8: Exposure controls/personal protection**Ingredients with workplace control parameters**

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

US

Components	Basis	Value	Control parameters	Note
n-Butyl Mercaptan	ACGIH	TWA	0.5 ppm,	URT irr,
	OSHA Z-1	TWA	10 ppm, 35 mg/m3	(b),
	OSHA Z-1-A	TWA	0.5 ppm, 1.5 mg/m3	

(b) The value in mg/m3 is approximate.
URT irr Upper Respiratory Tract irritation

Immediately Dangerous to Life or Health Concentrations (IDLH)

Substance name	CAS-No.	Control parameters	Update
n-Butyl Mercaptan	109-79-5	Immediately Dangerous to Life or Health Concentration Value 500 parts per million	1995-03-01

Engineering measures

Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

- Respiratory protection : Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this material if exposure to harmful levels of airborne material may occur, such as:. Air-Purifying Respirator for Organic Vapors. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.
- Hand protection : The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
- Eye protection : Eye wash bottle with pure water. Tightly fitting safety goggles.
- Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate:. Remove and wash contaminated clothing before re-use. Skin should be washed after contact. Footwear protecting against chemicals.
- Hygiene measures : When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

SECTION 9: Physical and chemical properties**Information on basic physical and chemical properties****Appearance**

Form : Liquid
Physical state : Liquid
Color : Clear
Odor : Pungent

Safety data

Flash point : -23 °C (-9 °F)
estimated

Lower explosion limit : No data available

Upper explosion limit : No data available

Oxidizing properties : no

Autoignition temperature : No data available

Thermal decomposition : No data available

Molecular formula : C₄H₁₀S

Molecular weight : 90.2 g/mol

pH : Not applicable

Pour point : No data available

Boiling point/boiling range : 84.98 °C (184.96 °F)

Vapor pressure : 2.75 PSI
at 38 °C (100 °F)

Relative density : 0.835
at 15.6 °C (60.1 °F)

Water solubility : Partly soluble

Partition coefficient: n-octanol/water : No data available

Viscosity, dynamic : 0.463 cP

Relative vapor density : 1
(Air = 1.0)

Evaporation rate : 1

Percent volatile : > 99 %

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

SECTION 10: Stability and reactivity

Reactivity : Stable under recommended storage conditions.

Chemical stability : This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Possibility of hazardous reactions

Hazardous reactions : Hazardous reactions: Hazardous polymerization does not occur.

Further information: No decomposition if stored and applied as directed.

Hazardous reactions: Vapors may form explosive mixture with air.

Conditions to avoid : Heat, flames and sparks.

Thermal decomposition : No data available

Hazardous decomposition products : Carbon oxides
Sulfur oxides

Other data : No decomposition if stored and applied as directed.

SECTION 11: Toxicological information**Acute oral toxicity**

sec-butyl Mercaptan : LD50: 5,176 mg/kg
Species: Rat

n-Butyl Mercaptan : LD50: 1,500 mg/kg
Species: Rat

Acute inhalation toxicity

sec-butyl Mercaptan : LC50: 98.3 mg/l
Exposure time: 4 h
Species: Rat
Sex: male and female
Test atmosphere: vapor
Information given is based on data obtained from similar substances.

n-Butyl Mercaptan : LC50: 22.3 mg/l
Exposure time: 4 h
Species: Rat

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

Test atmosphere: dust/mist

Acute dermal toxicity

sec-butyl Mercaptan : LD50: > 2,000 mg/kg
Species: Rat

**sec-Butyl Mercaptan
Skin irritation**

: May irritate skin.

**sec-Butyl Mercaptan
Eye irritation**

: Vapors may cause irritation to the eyes, respiratory system and the skin.

**sec-Butyl Mercaptan
Sensitization**

: Causes sensitization. largely based on animal evidence. Information given is based on data obtained from similar substances.

Repeated dose toxicity

sec-butyl Mercaptan : Species: Rat, male and female
Sex: male and female
Application Route: Inhalation
Exposure time: 13 wks
Number of exposures: 6 hrs/d, 5 d/wk
NOEL: 0.367 mg/l 99.6 ppm
Lowest observable effect level: 1.488 mg/l 403.4 ppm
Method: OECD Guideline 413
Target Organs: Blood, Liver, Kidney, Upper respiratory tract

n-Butyl Mercaptan

Species: Rat
Application Route: Inhalation
Dose: 0, 9, 70, 150 ppm
Exposure time: 13 wk
Number of exposures: 6 h/d, 5 d/wk
NOEL: 9 ppm
Lowest observable effect level: 70 ppm

Reproductive toxicity

sec-butyl Mercaptan : Species: Rat
Sex: male and female
Application Route: oral gavage
Dose: 10, 50, 200 mg/kg bw/d
Number of exposures: Daily
Test period: 42-50 days
Method: OECD Guideline 422
NOAEL Parent: 200 mg/kg
NOAEL F1: 50 mg/kg
Information given is based on data obtained from similar substances.

Developmental Toxicity

sec-butyl Mercaptan : Species: Rat
Application Route: Inhalation
Dose: 11, 99, 195 ppm

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

Exposure time: GD 6-16
 Number of exposures: 6 hrs/d
 Method: OECD Guideline 414
 NOAEL Teratogenicity: > = 195 ppm
 NOAEL Maternal: > = 195 ppm
 Information given is based on data obtained from similar substances.

Species: Mouse
 Application Route: Inhalation
 Dose: 11, 99, 195 ppm
 Exposure time: GD 6-16
 Number of exposures: 6 hrs/d
 Method: OECD Guideline 414
 NOAEL Teratogenicity: > = 195 ppm
 NOAEL Maternal: > = 195 ppm
 Information given is based on data obtained from similar substances.

n-Butyl Mercaptan

Species: Rat
 Application Route: Inhalation
 Dose: 0, 10, 68, 152 ppm
 Number of exposures: 6 h/d
 Test period: GD 6-19
 NOAEL Teratogenicity: > 152 ppm
 NOAEL Maternal: > 152 ppm

Species: Mouse
 Application Route: Inhalation
 Dose: 0, 10, 68, 152 ppm
 Number of exposures: 6 h/d
 Test period: GD 6-16
 NOAEL Maternal: 10 ppm

**sec-Butyl Mercaptan
Aspiration toxicity**

: May be harmful if swallowed and enters airways.

**sec-Butyl Mercaptan
Further information**

: Solvents may degrease the skin.

SECTION 12: Ecological information**Toxicity to fish****sec-butyl Mercaptan**

: LC50: 8.5 mg/l
 Exposure time: 96 h
 Species: Oncorhynchus mykiss (rainbow trout)
 static test Analytical monitoring: yes
 Method: OECD Test Guideline 203

n-Butyl Mercaptan

LC50: 2.4 mg/l
 Exposure time: 96 h
 Species: Oncorhynchus mykiss (rainbow trout)
 Information given is based on data obtained from similar substances.

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

Toxicity to daphnia and other aquatic invertebrates

- sec-butyl Mercaptan : 0.56 mg/l
 Exposure time: 48 h
 Species: *Daphnia magna* (Water flea)
 Immobilization Method: OECD Test Guideline 202
 Information refers to the main ingredient.
- n-Butyl Mercaptan EC50: 0.38 mg/l
 Exposure time: 48 h
 Species: *Daphnia magna* (Water flea)
 Information given is based on data obtained from similar substances.

Toxicity to algae

- sec-butyl Mercaptan : EC50: 3.4 mg/l
 Exposure time: 72 h
 Species: *Pseudokirchneriella subcapitata* (green algae)
 Growth inhibition Method: OECD Test Guideline 201
- n-Butyl Mercaptan EC50: 3.0 mg/l
 Exposure time: 96 h
 Species: *Selenastrum capricornutum* (algae)
 Information given is based on data obtained from similar substances.

M-Factor

- butane-2-thiol : M-Factor (Acute Aquat. Tox.) 1
 M-Factor (Chron. Aquat. Tox.) 1

Biodegradability

- sec-butyl Mercaptan : aerobic
 Result: Not readily biodegradable.
 6 %
 Testing period: 63 d
 Method: OECD Test Guideline 301F
 Information given is based on data obtained from similar substances.

Additional ecological information : Very toxic to aquatic life with long lasting effects.

Ecotoxicology Assessment

- Short-term (acute) aquatic hazard : Very toxic to aquatic life.
- Long-term (chronic) aquatic hazard : Very toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

The information in this SDS pertains only to the product as shipped.

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product : The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.

Contaminated packaging : Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

SECTION 14: Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)

UN2347, BUTYL MERCAPTAN, 3, II

IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)

UN2347, BUTYL MERCAPTAN, 3, II, (-23 °C), MARINE POLLUTANT, (SEC-BUTYL MERCAPTAN)

IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)

UN2347, BUTYL MERCAPTAN, 3, II

ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))

UN2347, BUTYL MERCAPTAN, 3, II, (D/E), ENVIRONMENTALLY HAZARDOUS, (SEC-BUTYL MERCAPTAN)

RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))

UN2347, BUTYL MERCAPTAN, 3, II, ENVIRONMENTALLY HAZARDOUS, (SEC-BUTYL MERCAPTAN)

ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)

UN2347, BUTYL MERCAPTAN, 3, II, ENVIRONMENTALLY HAZARDOUS, (SEC-BUTYL MERCAPTAN)

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**SECTION 15: Regulatory information****National legislation**

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)
Respiratory or skin sensitization

CERCLA Reportable Quantity : This material does not contain any components with a CERCLA RQ.

SARA 302 Reportable Quantity : This material does not contain any components with a SARA 302 RQ.

SARA 302 Threshold Planning Quantity : This material does not contain any components with a section 302 EHS TPQ.

SARA 304 Reportable Quantity : This material does not contain any components with a section 304 EHS RQ.

SARA 313 Components : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

Ozone-Depletion Potential : This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCM I Intermediate or Final VOC's (40 CFR 60.489).

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

US State Regulations

Pennsylvania Right To Know

: sec-butyl Mercaptan - 513-53-1
 n-Butyl Mercaptan - 109-79-5

California Prop. 65
Components

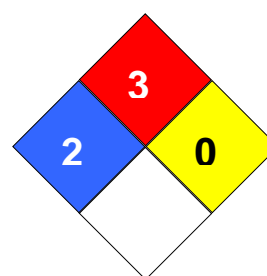
: This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

Notification status

Europe REACH	:	Not in compliance with the inventory
United States of America (USA) TSCA	:	On the inventory, or in compliance with the inventory
Canada NDSL	:	This product contains one or several components listed in the Canadian NDSL.
Australia AICS	:	On the inventory, or in compliance with the inventory
New Zealand NZIoC	:	On the inventory, or in compliance with the inventory
Japan ENCS	:	On the inventory, or in compliance with the inventory
Korea KECI	:	On the inventory, or in compliance with the inventory
Philippines PICCS	:	Not in compliance with the inventory
China IECSC	:	Not in compliance with the inventory

SECTION 16: Other information**NFPA Classification**

: Health Hazard: 2
 Fire Hazard: 3
 Reactivity Hazard: 0

**Further information**

Legacy SDS Number : 427800

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is

sec-Butyl Mercaptan

Version 3.1

Revision Date 2018-08-28

not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%		