1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier
Product Name: Allyl isothiocyanate
Product Code: SC-252361

Recommended use of the chemical and restrictions on use
For research use only. Not intended for diagnostic or therapeutic use.

2. HAZARDS IDENTIFICATION

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification
Acute toxicity - Oral: Category 3
Acute toxicity - Dermal: Category 2
Flammable liquids: Category 3

Label elements
Signal word: Danger
Hazard statements: Toxic if swallowed, Fatal in contact with skin, Flammable liquid and vapor

Precautionary Statements - Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not get in eyes, on skin, or on clothing
Wear protective gloves/protective clothing/eye protection/face protection
Keep away from heat/sparks/open flames/hot surfaces. — No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Precautionary Statements - Storage
Store locked up. Store in a well-ventilated place. Keep cool.

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant.

Hazards not otherwise classified (HNOC)

Other Information
Other hazards
Very toxic to aquatic life with long lasting effects. Very toxic to aquatic life.

NFPA
Health hazards 3
Flammability 2
Stability 0
Physical and chemical properties

HMIS
Health hazards 3
Flammability 2
Physical hazards 0
Personal protection

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS No.</th>
<th>Weight-%</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allyl isothiocyanate</td>
<td>57-06-7</td>
<td>&gt;98</td>
<td>= 112 mg/kg (Rat)</td>
<td>= 88 mg/kg (Rabbit)</td>
<td></td>
</tr>
<tr>
<td>Butylated hydroxytoulene</td>
<td>128-37-0</td>
<td>&lt;1</td>
<td>&gt;2930 mg/kg (Rat)</td>
<td>&gt;2000 mg/kg (Rat)</td>
<td></td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

First Aid Measures
General advice
Immediate medical attention is required. In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Eye contact
Wash with plenty of water.

Skin Contact
Wash off immediately with plenty of water.

Inhalation
Remove to fresh air if breathing is difficult, give oxygen. If not breathing, give artificial respiration.

Ingestion
Never give anything by mouth to an unconscious person. Clean mouth with water.

Self-protection of the first aider
Remove all sources of ignition.

Most important symptoms and effects, both acute and delayed
Symptoms
No information available.

Indication of any immediate medical attention and special treatment needed
Note to physicians
Treat symptomatically.

5. FIRE-FIGHTING MEASURES
Suitable Extinguishing Media
Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media
No information available.

Specific hazards arising from the chemical
Specific hazards arising from the chemical
flammable.

Hazardous combustion products

Explosion data
Sensitivity to Mechanical Impact
No information available.

Sensitivity to Static Discharge
No information available.

Protective equipment and precautions for firefighters
Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Personal precautions
Remove all sources of ignition. Evacuate personnel to safe areas. Ensure adequate ventilation, especially in confined areas. Use personal protective equipment as required.

Environmental precautions
Environmental precautions
Prevent further leakage or spillage if safe to do so. Prevent product from entering drains. See Section 12 for additional Ecological Information. Should not be released into the environment. Do not flush into surface water or sanitary sewer system.

Methods and material for containment and cleaning up
Methods for containment
Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Dam up. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Pick up and transfer to properly labeled containers. Soak up with inert absorbent material.

7. HANDLING AND STORAGE

Precautions for safe handling
Advice on safe handling
Ensure adequate ventilation, especially in confined areas. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Take precautionary measures against static discharges. Use spark-proof tools and explosion-proof equipment. All equipment used when handling the product must be grounded. Corrosive hazard. Wear protective gloves/clothing and eye/face protection. Noxious vapor/odor. Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities
Storage Conditions
Keep tightly closed in a dry and cool place. Keep in properly labeled containers. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Store at 4 °C.

Incompatible materials
Strong oxidizing agents. Strong acids.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
Exposure Guidelines
Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butylated hydroxytoluene 128-37-0</td>
<td>TWA: 2 mg/m³ inhalable fraction and vapor</td>
<td>(vacated) TWA: 10 mg/m³</td>
<td>TWA: 10 mg/m³</td>
</tr>
</tbody>
</table>

NIOSH IDLH: Immediately Dangerous to Life or Health

Appropriate engineering controls
Engineering Controls
Ensure adequate ventilation, especially in confined areas

Individual protection measures, such as personal protective equipment
Eye/face protection
Wear safety glasses with side shields (or goggles).

Skin and Body Protection
Wear protective gloves and protective clothing.

Respiratory protection
If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations
When using do not eat, drink or smoke. Regular cleaning of equipment, work area and clothing is recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>No information available</td>
</tr>
<tr>
<td>Odor</td>
<td>Pungent May be unpleasant</td>
</tr>
<tr>
<td>pH</td>
<td>No information available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>-80 °C</td>
</tr>
<tr>
<td>Boiling point</td>
<td>150 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td>46 °C CC (closed cup)</td>
</tr>
<tr>
<td>Liquid Density</td>
<td>1.01 g/mL</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No information available</td>
</tr>
<tr>
<td>Upper flammability limits</td>
<td>No information available</td>
</tr>
<tr>
<td>Lower flammability limit</td>
<td>No information available</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>3.7 mmHg</td>
</tr>
<tr>
<td>Vapor density</td>
<td>3.4</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>1.02</td>
</tr>
<tr>
<td>Water solubility</td>
<td>No information available</td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>No information available</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>2.15</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>No information available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No information available</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>No information available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No information available</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No information available</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Reactivity
Not applicable
Chemical stability: Stable under recommended storage conditions.
Possibility of Hazardous Reactions: Contact with acids may liberate toxic gas.
Hazardous polymerization: No information available.
Conditions to avoid: Heat, flames and sparks.
Incompatible materials: Strong oxidizing agents. Strong acids.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure:
- Inhalation: No data available.
- Eye contact: No data available.
- Skin Contact: No data available.
- Ingestion: No data available.

Information on toxicological effects:
- Symptoms: No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure:
- Chronic Toxicity: No information available.
- Carcinogenicity: The table below indicates whether each agency has listed any ingredient as a carcinogen.

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allyl isothiocyanate</td>
<td>57-06-7</td>
<td>Group 3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Butylated hydroxytoulene</td>
<td>128-37-0</td>
<td>Group 3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

IARC (International Agency for Research on Cancer) Not classifiable as a human carcinogen

Numerical measures of toxicity - Product Information:
- Unknown acute toxicity: No information available.
- The following values are calculated based on chapter 3.1 of the GHS document:
  - ATEmix (oral): 112 mg/kg
  - ATEmix (dermal): 88 mg/kg

12. ECOLOGICAL INFORMATION

Ecotoxicity: Very toxic to aquatic life with long lasting effects

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to Microorganisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allyl isothiocyanate</td>
<td>57-06-7</td>
<td>0.054 - 0.109: 96 h Oryzias latipes mg/L LC50 flow-through 0.0856: 96 h Pimephales promelas mg/L LC50 flow-through</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Butylated hydroxytoulene</td>
<td>128-37-0</td>
<td>0.42: 72 h Desmodesmus subspicatus mg/L EC50 6: 72 h Pseudokirchneriella subcapitata mg/L EC50 5: 48 h Oryzias latipes mg/L LC50</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

0% of the mixture consists of components(s) of unknown hazards to the aquatic environment.

Persistence and degradability: No information available.
Bioaccumulation: No information available.
Mobility: No information available.

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Partition coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butylated hydroxytoulene</td>
<td>4.17</td>
</tr>
</tbody>
</table>
13. DISPOSAL CONSIDERATIONS

Disposal of wastes
Disposal should be in accordance with applicable regional, national and local laws and regulations. Should not be released into the environment.

Contaminated packaging
Do not reuse container.

US EPA Waste Number
D001

14. TRANSPORT INFORMATION

DOT
UN/ID no  UN1545
Hazard Class  6.1
Subsidiary class  3
Packing Group  II
Proper shipping name  Allyl isothiocyanate, stabilized
Description  UN1545, Allyl isothiocyanate, stabilized, 6.1 (3), II
Emergency Response Guide Number  155

IMDG
UN/ID no  UN1545
Hazard Class  6.1
Subsidiary hazard class  3
Packing Group  II
Proper shipping name  Allyl isothiocyanate, stabilized
Description  UN1545, Allyl isothiocyanate, stabilized, 6.1 (3), II, (46°C c.c.), Marine pollutant
Special Provisions  386
EmS-No  F-E, S-D

IATA
UN/ID no  UN1545
Hazard Class  6.1
Subsidiary hazard class  3
Packing Group  II
Proper shipping name  Allyl isothiocyanate, stabilized
Description  UN1545, Allyl isothiocyanate, stabilized, 6.1 (3), II
ERG Code  6F

15. REGULATORY INFORMATION

International Inventories
All of the components in the product are on the following Inventory lists
TSCA (United States): Canada (DSL/NDSL) Europe (EINECS/ELINCS/NLP) Australia (AICS) China (IECSC) ENCS (Japan): Philippines (PICCS)

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>ENCS</th>
<th>IECSC</th>
<th>KECL</th>
<th>PICCS</th>
<th>AICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allyl isothiocyanate</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Butylated hydroxytoulene</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

X - Listed
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories
- Acute health hazard: Yes
- Chronic Health Hazard: No
- Fire hazard: Yes
- Sudden release of pressure hazard: No
- Reactive hazard: No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allyl isothiocyanate</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>57-06-7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION

Revision note
No information available

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

End of Safety Data Sheet