Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier
Product Name • Bismuth Germanate Crystal
Synonyms • BGO or Bi4Ge3O12
CAS Number • 12233-56-6

1.2 Relevant identified uses of the substance or mixture and uses advised against
Relevant identified use(s) • Scintillation material for Radiation Detection

1.3 Details of the supplier of the safety data sheet
Manufacturer • Saint-Gobain Crystals
17900 Great Lakes Parkway
Hiram, OH 44234
United States
www.crystals.saint-gobain.com
scintillation@saint-gobain.com

Telephone (General) • 440-834-5600

1.4 Emergency telephone number
Manufacturer • 1-800-424-9300 - ChemTrec
Manufacturer • 703-525-3887 - Outside U.S.

Section 2: Hazards Identification

EU/EEC
According to: EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture
CLP • Skin Irritation 2 - H315
      Eye Irritation 2 - H319
      Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335
DSD/DPD • Irritant (Xi)
          R36, R37, R38

2.2 Label Elements
CLP

WARNING
Hazard statements
• H315 - Causes skin irritation
• H319 - Causes serious eye irritation
• H335 - May cause respiratory irritation

Precautionary statements
Prevention • P261 - Avoid breathing dust.
• P264 - Wash thoroughly after handling.
• P271 - Use only outdoors or in a well-ventilated area.
• P280 - Wear protective gloves/protective clothing/eye protection/face protection.
Response • 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/physician if you feel unwell.
• P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
• P321 - Specific treatment, see supplemental first aid information.
• P332+P313 - If skin irritation occurs: Get medical advice/attention.
• 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.
• P337+P313 - If eye irritation persists: Get medical advice/attention.

Storage/Disposal • P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
• P405 - Store locked up.
• P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other Hazards
CLP • According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

DSD/DPD • According to European Directive 1999/45/EC this material is considered dangerous.

United States (US)
According to: OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture
OSHA HCS 2012 • Skin Irritation 2
• Eye Irritation 2
• Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation

2.2 Label elements
OSHA HCS 2012

WARNING
Hazard statements
• Causes skin irritation
• Causes serious eye irritation
• May cause respiratory irritation

Precautionary statements
Prevention • Avoid breathing dust.  
Wash thoroughly after handling.  
Use only outdoors or in a well-ventilated area.  
Wear protective gloves/protective clothing/eye protection/face protection.

Response • IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
Call a POISON CENTER or doctor/physician if you feel unwell.  
If on skin: Wash with plenty of water.  
Specific treatment, see supplemental first aid information.  
Take off contaminated clothing and wash before reuse.  
If skin irritation occurs: Get medical advice/attention.  
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
If eye irritation persists: Get medical advice/attention.

Storage/Disposal • Store in a well-ventilated place. Keep container tightly closed.  
Store locked up.  
Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards

Canada
According to: WHMIS

2.1 Classification of the substance or mixture
WHMIS • Other Toxic Effects - D2B

2.2 Label elements
WHMIS

WHMIS • Other Toxic Effects - D2B

2.3 Other hazards
WHMIS • In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Identifiers</th>
<th>%</th>
<th>LD50/LC50</th>
<th>Classifications According to Regulation/Directive</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bismuth Germanate</td>
<td>CAS: 12233-56-6</td>
<td>100%</td>
<td>NDA</td>
<td>EU DSD/DPD: Not Classified EU CLP: Not Classified OSHA HCS 2012: Not Classified</td>
<td>NDA</td>
</tr>
</tbody>
</table>
### 3.2 Mixtures

- Material does not meet the criteria of a mixture.

### Section 4 - First Aid Measures

#### 4.1 Description of first aid measures

**Inhalation**
- Move victim to fresh air. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. If signs/symptoms continue, get medical attention.

**Skin**
- Wash skin with soap and water. If irritation develops and persists, get medical attention.

**Eye**
- In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. If eye irritation persists: Get medical advice/attention.

**Ingestion**
- If large quantities are swallowed, call a physician immediately.

#### 4.2 Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

#### 4.3 Indication of any immediate medical attention and special treatment needed

**Notes to Physician**
- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

### Section 5 - Firefighting Measures

#### 5.1 Extinguishing media

**Suitable Extinguishing Media**
- Use water, carbon dioxide or foam.

**Unsuitable Extinguishing Media**
- No data available

#### 5.2 Special hazards arising from the substance or mixture

**Unusual Fire and Explosion Hazards**
- Not a fire or explosion hazard.

**Hazardous Combustion Products**
- No data available

#### 5.3 Advice for firefighters

- Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.

### Section 6 - Accidental Release Measures

#### 6.1 Personal precautions, protective equipment and emergency procedures

**Personal Precautions**
- Ventilate enclosed areas. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

**Emergency Procedures**
- As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. Keep unauthorized personnel away.

#### 6.2 Environmental precautions

- Avoid release to the environment.

#### 6.3 Methods and material for containment and cleaning up
Containment/Clean-up Measures

- If broken or not usable, scoop up for vacuum into a container for disposal.

6.4 Reference to other sections

- Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling

- Use only with adequate ventilation. Wear appropriate personal protective equipment, avoid direct contact. Avoid breathing dust. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

7.2 Conditions for safe storage, including any incompatibilities

Storage

- Keep container/package tightly closed and in a well-ventilated place.

7.3 Specific end use(s)

- Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits/Guidelines

- No applicable exposure limits available for product or components.

8.2 Exposure controls

Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Respiratory

- For limited exposure use an N95 dust mask. For prolonged exposure use an air-purifying respirator with high efficiency particulate air (HEPA) filters. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

- Wear safety goggles.

Skin/Body

- Wear appropriate gloves. Wear long sleeves and/or protective coveralls.

Environmental Exposure Controls

- Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Section 9 - Physical and Chemical Properties

9.1 Information on Basic Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Solid</th>
<th>Appearance/Description</th>
<th>Water white transparent solid to pale yellow translucent solid; odorless.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form</td>
<td>Solid</td>
<td>Appearance/Description</td>
<td>Water white transparent solid to pale yellow translucent solid; odorless.</td>
</tr>
<tr>
<td>Color</td>
<td>Water white transparent to pale yellow translucent.</td>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Data lacking</td>
<td>Odor</td>
<td>Odorless</td>
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</table>
### General Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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<tbody>
<tr>
<td>Boiling Point</td>
<td>Data lacking</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Data lacking</td>
</tr>
<tr>
<td>Specific Gravity/Relative Density</td>
<td>7.13 g/cm³</td>
</tr>
<tr>
<td>Melting Point/Freezing Point</td>
<td>1050 °C (1922 °F)</td>
</tr>
<tr>
<td>pH</td>
<td>Not relevant</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Data lacking</td>
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<tr>
<td>Explosive Properties</td>
<td>Data lacking</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Data lacking</td>
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<tr>
<td>Oxidizing Properties:</td>
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</tbody>
</table>

### Volatility

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapor Pressure</td>
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</tr>
<tr>
<td>Evaporation Rate</td>
<td>Data lacking</td>
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</tbody>
</table>

### Flammability

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash Point</td>
<td>Not relevant</td>
</tr>
<tr>
<td>LEL</td>
<td>Not relevant</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
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</tr>
<tr>
<td>UEL</td>
<td>Not relevant</td>
</tr>
<tr>
<td>Autoignition</td>
<td>Data lacking</td>
</tr>
</tbody>
</table>

### Environmental

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octanol/Water Partition coefficient</td>
<td>Data lacking</td>
</tr>
</tbody>
</table>

### 9.2 Other Information

- No additional physical and chemical parameters noted.

### Section 10: Stability and Reactivity

#### 10.1 Reactivity

- No dangerous reaction known under conditions of normal use.

#### 10.2 Chemical stability

- Stable under normal temperatures and pressures.

#### 10.3 Possibility of hazardous reactions

- Hazardous polymerization not indicated.

#### 10.4 Conditions to avoid

- None expected.

#### 10.5 Incompatible materials

- No data available.

#### 10.6 Hazardous decomposition products

- None expected.

### Section 11 - Toxicological Information

#### 11.1 Information on toxicological effects

<table>
<thead>
<tr>
<th>GHS Properties</th>
<th>Classification</th>
</tr>
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<tbody>
<tr>
<td>Acute toxicity</td>
<td>EU/CLP • Data lacking</td>
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<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
</tr>
<tr>
<td>Skin corrosion/Irritation</td>
<td>EU/CLP • Skin Irritation 2</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Skin Irritation 2</td>
</tr>
<tr>
<td>Serious eye damage/Irritation</td>
<td>EU/CLP • Eye Irritation 2</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Eye Irritation 2</td>
</tr>
</tbody>
</table>
Skin sensitization

- EU/CLP: Data lacking
- OSHA HCS 2012: Data lacking

Respiratory sensitization

- EU/CLP: Data lacking
- OSHA HCS 2012: Data lacking

Aspiration Hazard

- EU/CLP: Data lacking
- OSHA HCS 2012: Data lacking

Carcinogenicity

- EU/CLP: Data lacking
- OSHA HCS 2012: Data lacking

Germ Cell Mutagenicity

- EU/CLP: Data lacking
- OSHA HCS 2012: Data lacking

Toxicity for Reproduction

- EU/CLP: Data lacking
- OSHA HCS 2012: Data lacking

STOT-SE

- EU/CLP: Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
- OSHA HCS 2012: Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation

STOT-RE

- EU/CLP: Data lacking
- OSHA HCS 2012: Data lacking

Potential Health Effects

**Inhalation**

- **Acute (Immediate)**: May cause respiratory irritation.
- **Chronic (Delayed)**: No data available

**Skin**

- **Acute (Immediate)**: Causes skin irritation.
- **Chronic (Delayed)**: No data available.

**Eye**

- **Acute (Immediate)**: Causes serious eye irritation.
- **Chronic (Delayed)**: No data available.

**Ingestion**

- **Acute (Immediate)**: No adverse effects expected.
- **Chronic (Delayed)**: No data available.

---

**Section 12 - Ecological Information**

**12.1 Toxicity**

- Material data lacking.

**12.2 Persistence and degradability**

- Material data lacking.

**12.3 Bioaccumulative potential**

- Material data lacking.

**12.4 Mobility in Soil**

- Material data lacking.
12.5 Results of PBT and vPvB assessment

- No PBT and vPvB assessment has been conducted.

12.6 Other adverse effects

- No studies have been found.

### Section 13 - Disposal Considerations

#### 13.1 Waste treatment methods

**Product waste**

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

**Packaging waste**

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

### Section 14 - Transport Information

<table>
<thead>
<tr>
<th>14.1 UN number</th>
<th>14.2 UN proper shipping name</th>
<th>14.3 Transport hazard class(es)</th>
<th>14.4 Packing group</th>
<th>14.5 Environmental hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
</tr>
<tr>
<td>TDG</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
</tr>
<tr>
<td>IMO/IMDG</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
</tr>
<tr>
<td>IATA/ICAO</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
<td>NDA</td>
</tr>
</tbody>
</table>

14.6 Special precautions for user

- None specified.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

- Data lacking.

### Section 15 - Regulatory Information

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

**SARA Hazard Classifications**

- Acute

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>State Right To Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bismuth Germanate</td>
<td>12233-56-6</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bismuth Germanate</td>
<td>12233-56-6</td>
<td>Canada - WHMIS - Classifications of Substances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bismuth Germanate</td>
</tr>
</tbody>
</table>

Preparation Date: 08/January/2015
Revision Date: 24/May/2017
### Canada - WHMIS - Ingredient Disclosure List

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

### Environment

**Canada - CEPA - Priority Substances List**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

### United States

**Labor**

**U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - OSHA - Specifically Regulated Chemicals**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**Environment**

**U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - CERCLA/SARA - Section 313 - Emission Reporting**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

### United States - California

**Environment**

**U.S. - California - Proposition 65 - Carcinogens List**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - California - Proposition 65 - Developmental Toxicity**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - California - Proposition 65 - Reproductive Toxicity - Female**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed

**U.S. - California - Proposition 65 - Reproductive Toxicity - Male**

- **Bismuth Germanate**
  - CAS No: 12233-56-6
  - Not Listed
United States - Pennsylvania

Labor

U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
- Bismuth Germanate 12233-56-6 Not Listed

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances
- Bismuth Germanate 12233-56-6 Not Listed

15.2 Chemical Safety Assessment
- No Chemical Safety Assessment has been carried out.

Section 16 - Other Information

Revision Date 24/May/2017
Preparation Date 08/January/2015
Disclaimer/Statement of Liability
- Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgement.

Key to abbreviations
NDA = No data available