1 Identification of the substance/mixture and of the company/undertaking

Product identifier
Product name: Boron oxide
Stock number: 41786
CAS Number: 1303-86-2
EC number: 215-125-8
Index number: 005-008-00-8

Relevant identified uses of the substance or mixture and uses advised against.
Sector of Use SU24 Scientific research and development

Details of the supplier of the safety data sheet
Manufacturer/Supplier:
Alfa Aesar, A Johnson Matthey Company
Johnson Matthey Catalog Company, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com

Information Department: Health, Safety and Environmental Department
Emergency telephone number:
During normal hours the Health, Safety and Environmental Department at (800) 343-0660. After normal hours call Carechem 24 at (866) 928-0789.

2 Hazards identification

Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008

GHS08 Health hazard

Repr. 1B H360 May damage fertility or the unborn child.

Classification according to Directive 67/548/EEC or Directive 1999/45/EC
T; Toxic
R60-61: May impair fertility. May cause harm to the unborn child.

Information concerning particular hazards for human and environment: Not applicable

Label elements
Labelling according to Regulation (EC) No 1272/2008
The substance is classified and labelled according to the CLP regulation.

Hazard pictograms

GHS08

Signal word Danger
Hazard statements
H360 May damage fertility or the unborn child.

Precautionary statements
P201 Obtain special instructions before use.
P308+P313 IF exposed or concerned: Get medical advice/attention.

Hazard description:
WHMIS classification
D2A - Very toxic material causing other toxic effects

(Contd. on page 2)
### Classification system

#### HMIS ratings (scale 0-4)

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Health (acute effects) = 1
Flammability = 0
Reactivity = 0

**Other hazards**

**Results of PBT and vPvB assessment**

PBT: Not applicable.
vPvB: Not applicable.

### 3 Composition/information on ingredients

**Chemical characterization: Substances**

<table>
<thead>
<tr>
<th>CAS# Description</th>
<th>EC number</th>
<th>Index number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1303-86-2 Boron oxide</td>
<td>215-125-8</td>
<td>005-008-00-8</td>
</tr>
</tbody>
</table>

**SVHC**

| 1303-86-2 Boron oxide |

### 4 First aid measures

**Description of first aid measures**

**After inhalation**

Supply fresh air. If required, provide artificial respiration. Keep patient warm. Seek immediate medical advice.

**After skin contact**

Immediately wash with water and soap and rinse thoroughly. Seek immediate medical advice.

**After eye contact**

Rinse opened eye for several minutes under running water. Then consult a doctor.

**After swallowing**

Seek medical treatment.

**Information for doctor**

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

Indication of any immediate medical attention and special treatment needed
No further relevant information available.

### 5 Firefighting measures

**Extinguishing media**

Product is not flammable. Use fire fighting measures that suit the surrounding fire.

**Special hazards arising from the substance or mixture**

If this product is involved in a fire, the following can be released:
Boron oxide

**Advice for firefighters**

Protective equipment:

Wear self-contained respirator.

Wear fully protective impervious suit.

### 6 Accidental release measures

**Personal precautions, protective equipment and emergency procedures**

Ensure adequate ventilation

**Environmental precautions:**

Do not allow material to be released to the environment without proper governmental permits.

**Methods and material for containment and cleaning up:**

Dispose contaminated material as waste according to item 13.

**Reference to other sections**

See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.

(Contd. on page 3)
Safety Data Sheet
According to OSHA and ANSI

Printing date 12/20/2012
Reviewed on 12/13/2012

Product name: Boron oxide

See Section 13 for disposal information.

7 Handling and storage

Handling
Precautions for safe handling
- Keep container tightly sealed.
- Store in cool, dry place in tightly closed containers.
- Ensure good ventilation at the workplace.
- Open and handle container with care.

Information about protection against explosions and fires: The product is not flammable

Conditions for safe storage, including any incompatibilities

Storage
Requirements to be met by storerooms and receptacles: No special requirements.

Information about storage in one common storage facility: Store away from water/moisture.

Further information about storage conditions:
- This product is hygroscopic.
- Store under dry inert gas.
- Keep container tightly sealed.
- Store in cool, dry conditions in well sealed containers.
- Protect from humidity and water.

Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

Additional information about design of technical systems:
- Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters
Components with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>Component</th>
<th>Limit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boron oxide</td>
<td>mg/m³</td>
</tr>
<tr>
<td>ACGIH TLV</td>
<td>10</td>
</tr>
<tr>
<td>Austria MAK</td>
<td>15</td>
</tr>
<tr>
<td>Denmark TWA</td>
<td>10</td>
</tr>
<tr>
<td>France VME</td>
<td>10</td>
</tr>
<tr>
<td>Germany MAK</td>
<td>15</td>
</tr>
<tr>
<td>Netherlands MAC-TGG</td>
<td>10</td>
</tr>
<tr>
<td>Norway TWA</td>
<td>10</td>
</tr>
<tr>
<td>Poland TWA</td>
<td>10</td>
</tr>
<tr>
<td>Switzerland MAK-W</td>
<td>10; 50-KZG-W</td>
</tr>
<tr>
<td>United Kingdom TWA</td>
<td>10; 20-STEL</td>
</tr>
<tr>
<td>USA PEL</td>
<td>15 (total dust)</td>
</tr>
<tr>
<td>USA REL (USA)</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>USA TLV (USA)</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>USA EL (Canada)</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>USA EV (Canada)</td>
<td>10 mg/m³</td>
</tr>
</tbody>
</table>

1303-86-2 Boron oxide (100.0%)

<table>
<thead>
<tr>
<th>Limit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL (USA)</td>
</tr>
<tr>
<td>REL (USA)</td>
</tr>
<tr>
<td>TLV (USA)</td>
</tr>
<tr>
<td>EL (Canada)</td>
</tr>
<tr>
<td>EV (Canada)</td>
</tr>
</tbody>
</table>

*total dust

Additional information: No data

Exposure controls

Personal protective equipment

General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
- Keep away from foodstuffs, beverages and feed.
- Remove all soiled and contaminated clothing immediately.
- Wash hands before breaks and at the end of work.
- Maintain an ergonomically appropriate working environment.

Breathing equipment: Use suitable respirator when high concentrations are present.

Protection of hands:
- Impervious gloves
- Check protective gloves prior to each use for their proper condition.
- The selection of suitable gloves not only depends on the material, but also on quality.
- Quality will vary from manufacturer to manufacturer.
9 Physical and chemical properties

Information on basic physical and chemical properties

General Information

Appearance:
   Form: Powder
   Color: White
   Odor: Odorless
   Odor threshold: Not determined.

pH-value (10 g/l) at 20°C (68 °F): 4

Change in condition

Melting point/Melting range: ca 450°C (ca 842 °F)
Boiling point/Boiling range: 1860°C (3380 °F)
Sublimation temperature / start: Not determined

Flash point: Not applicable
Flammability (solid, gaseous) Not determined.
Ignition temperature: Not determined
Decomposition temperature: Not determined
Auto igniting: Not determined.

Danger of explosion: Product does not present an explosion hazard.

Explosion limits:
   Lower: Not determined
   Upper: Not determined

Vapor pressure: Not applicable.
Density at 20°C (68 °F): 2.46 ±0.01 g/cm³ (20.529 ±0.083 lbs/gal)
Relative density Not determined.
Vapor density Not applicable.
Evaporation rate Not applicable.

Solubility in / Miscibility with
Water at 20°C (68 °F): 36 g/l
Partition coefficient (n-octanol/water): Not determined.
Viscosity:
   dynamic: Not applicable.
   kinematic: Not applicable.

Other information No further relevant information available.

10 Stability and reactivity

Reactivity

Chemical stability

Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.

Possibility of hazardous reactions No dangerous reactions known

Incompatible materials: Water/moisture

Hazardous decomposition products:
No dangerous decomposition products known

Boron oxide

11 Toxicological information

Information on toxicological effects

Acute toxicity:
   Primary irritant effect:
   on the skin: May cause irritation
   on the eye: May cause irritation

Sensitization: No sensitizing effects known.

Subacute to chronic toxicity:

The Registry of Toxic Effects of Chemical Substances (RTECS) reports the following effects in laboratory animals:

Kidney, Ureter, Bladder - urine volume increased.
Kidney, Ureter, Bladder - other changes in urine composition.
Kidney, Ureter, Bladder - incontinence

Sense Organs and Special Senses (Olfaction) - effect, not otherwise specified.
### 12 Ecological information

**Toxicity**

Aquatic toxicity: No further relevant information available.

Persistence and degradability: No further relevant information available.

Behavior in environmental systems:

Bioaccumulative potential: No further relevant information available.

Mobility in soil: No further relevant information available.

Additional ecological information:

General notes:

Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

Do not allow material to be released to the environment without proper governmental permits.

Results of PBT and vPvB assessment

PBT: Not applicable.

vPvB: Not applicable.

Other adverse effects: No further relevant information available.

### 13 Disposal considerations

**Waste treatment methods**

Recommendation: Consult state, local or national regulations to ensure proper disposal.

Uncleaned packagings:

Recommendation: Disposal must be made according to official regulations.

### 14 Transport information

Not a hazardous material for transportation.

| UN-Number | DOT, ADR, IMDG, IATA | None |
| UN proper shipping name | DOT, ADR, IMDG, IATA | None |
| Transport hazard class(es) | DOT, ADR, IMDG, IATA | Class
| Packing group | DOT, ADR, IMDG, IATA | None |
| Environmental hazards: Marine pollutant: | Not applicable. |
| Special precautions for user | Not applicable. |
| Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code | Not applicable. |
| Transport/Additional information: | Not dangerous according to the above specifications. |

### 15 Regulatory information

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

National regulations

All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
Product name: Boron oxide

(Contd. of page 5)

All components of this product are listed on the Canadian Domestic Substances List (DSL).

Information about limitation of use: For use only by technically qualified individuals.

Other regulations, limitations and prohibitive regulations

Substances of very high concern (SVHC) according to REACH, Article 57

This product contains a product listed by the European Chemicals Agency (ECHA) as a Substance of Very High Concern (SVHC). Information concerning SVHC can be found in Annex XIV for the REACH Regulation.

REACH - Pre-registered substances Substance is listed.

Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing MSDS: Health, Safety and Environmental Department.

Contact:
Zachariah C. Holt
Global EHS Manager

Abbreviations and acronyms:
RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)
ICAO: International Civil Aviation Organization
ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO)
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DST: US Department of Transportation
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)