

## Safety Data Sheet



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

#### 1.1 Product identifier

|                          |                                      |
|--------------------------|--------------------------------------|
| <b>Product Name</b>      | • <b>Selenium (&lt;1mm diameter)</b> |
| <b>Synonyms</b>          | • Sélénium (<1 mm de diamètre)       |
| <b>CAS Number</b>        | • 7782-49-2                          |
| <b>Product Code</b>      | • 1590                               |
| <b>EC Number</b>         | • 231-957-4                          |
| <b>EU Index Number</b>   | • 034-001-00-2                       |
| <b>Molecular Formula</b> | • Se                                 |
| <b>Molecular Weight</b>  | • 78.96                              |

#### 1.2 Relevant identified uses of the substance or mixture and uses advised against

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Relevant identified use(s)</b> | • Industrial uses : Use of substance as such in preparations at industrial sites; Manufacture of basic metals, including alloys; Service life (professional worker): use of metal containing articles. Article service life: Industrial use by workers with abrasive techniques. Industrial use as additive in glass manufacture; Industrial use in the vulcanization of rubber. Industrial use in thin film production by physical vapor deposition. Industrial use of coatings; Used as intermediate in the manufacture of metal compounds |
| <b>Use(s) advised against</b>     | • No specific uses advised against are identified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

#### 1.3 Details of the supplier of the safety data sheet

|                            |                                                                                                                  |
|----------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Manufacturer</b>        | • 5N Plus Inc<br>4385 Garand Street<br>St Laurent, Quebec H4R 2B4<br>Canada<br>www.5nplus.com<br>MSDS@5nplus.com |
| <b>Telephone (General)</b> | • (514) 856-0644 ext 2395                                                                                        |

#### 1.4 Emergency telephone number

- For Chemical Emergency Spill, Leak, Fire, Exposure, or Accident Call CHEMTREC Day or Night Within USA and Canada: 1-800-424-9300 CCN14093 Outside USA and Canada: +1 703-527-3887 (collect calls accepted)

### Section 2: Hazards Identification

## EU/EEC

According to Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]

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

### 2.1 Classification of the substance or mixture

- |                |                                                                                                                                                                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CLP</b>     | <ul style="list-style-type: none"><li>Acute Toxicity Inhalation 3 - H331</li><li>Acute Toxicity Oral 3 - H301</li><li>Hazardous to the aquatic environment Chronic 4 - H413</li><li>Specific Target Organ Toxicity Repeated Exposure 2 - H373</li></ul> |
| <b>DSD/DPD</b> | <ul style="list-style-type: none"><li>Toxic (T)</li></ul> <p>R33, R53, R23/25</p>                                                                                                                                                                       |

### 2.2 Label Elements

CLP

#### DANGER



- Hazard statements**
- H373 - May cause damage to organs through prolonged or repeated exposure.
  - H413 - May cause long lasting harmful effects to aquatic life
  - H301+H331 - Toxic if swallowed or if inhaled

#### Precautionary statements

- |                         |                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Prevention</b>       | <ul style="list-style-type: none"><li>P273 - Avoid release to the environment.</li><li>P260 - Do not breathe dust, fume, gas, mist, vapours and/or spray.</li><li>P270 - Do not eat, drink or smoke when using this product.</li><li>P271 - Use only outdoors or in a well-ventilated area.</li><li>P264 - Wash thoroughly after handling.</li></ul> |
| <b>Response</b>         | <ul style="list-style-type: none"><li>P314 - Get medical advice/attention if you feel unwell.</li><li>P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.</li><li>P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.</li></ul>                                 |
| <b>Storage/Disposal</b> | <ul style="list-style-type: none"><li>P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.</li><li>P403+P233 - Store in a well-ventilated place. Keep container tightly closed.</li><li>P405 - Store locked up.</li></ul>                                                      |

DSD/DPD



- Risk phrases**
- R33 - Danger of cumulative effects.
  - R53 - May cause long-term adverse effects in the aquatic environment.
  - R23/25 - Toxic by inhalation and if swallowed.
- Safety phrases**
- S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
  - S37 - Wear suitable gloves.

### 2.3 Other Hazards

- |                |                                                                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CLP</b>     | <ul style="list-style-type: none"><li>The PBT and vPvB criteria of Annex XIII to the regulation (EC) 1907/2006 does not apply to inorganic substances.</li></ul> |
| <b>DSD/DPD</b> | <ul style="list-style-type: none"><li>None</li></ul>                                                                                                             |

## United States (US)

According to OSHA 29 CFR 1910.1200 HCS

## 2.1 Classification of the substance or mixture

OSHA HCS 2012

- Acute Toxicity Inhalation 3 - H331  
Acute Toxicity Oral 3 - H301  
Specific Target Organ Toxicity Repeated Exposure 2 - H373

## 2.2 Label elements

OSHA HCS 2012

**DANGER**



- Hazard statements**
- May cause damage to organs through prolonged or repeated exposure. - H373  
May cause long lasting harmful effects to aquatic life - H413  
Toxic if inhaled - H331  
Toxic if swallowed - H301

### Precautionary statements

- Prevention**
- Avoid release to the environment. - P273  
Do not breathe dust, fume, gas, mist, vapours and/or spray. - P260  
Do not eat, drink or smoke when using this product. - P270  
Use only outdoors or in a well-ventilated area. - P271  
Wash thoroughly after handling. - P264
- Response**
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. - P304+P340  
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. - P301+P310
- Storage/Disposal**
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. - P501  
Store in a well-ventilated place. Keep container tightly closed. - P403+P233  
Store locked up. - P405

## 2.3 Other hazards

OSHA HCS 2012

- None

## Canada

According to WHMIS

## 2.1 Classification of the substance or mixture

WHMIS

- Not classified

## 2.2 Label elements

WHMIS

- No label element(s) required.

## 2.3 Other hazards

WHMIS

- In Canada, the product mentioned above is not considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

## Section 3 - Composition/Information on Ingredients

### 3.1 Substances

| Composition   |                                                                                         |          |                                                                                                                                                                                                      |
|---------------|-----------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chemical Name | Identifiers                                                                             | %        | Classifications According to Regulation/Directive                                                                                                                                                    |
| Selenium      | CAS:7782-49-2<br>EC Number:231-957-4<br>REACH:01-2119981706-25<br>EU Index:034-001-00-2 | >= 99.9% | WHMIS:<br>EU DSD/DPD: R23/25; R33; R53; Toxic(T)<br>EU CLP: Acute Tox. Inhal. 3; Acute Tox. Oral 3; Aquatic Chronic 4; STOT RE 2<br>OSHA HCS 2012: Acute Tox. Inhal. 3; Acute Tox. Oral 3; STOT RE 2 |

## 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

- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

#### Skin

- IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

#### Eye

- 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.

#### Ingestion

- Do not induce vomiting. If vomiting occurs, the head should be kept low so that stomach vomit doesn't enter the lungs. Call a physician or poison control center 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

- No recommendation given, but first aid may still be required in case of accidental exposure, inhalation or ingestion of this chemical. If in doubt, GET MEDICAL ATTENTION PROMPTLY!

### 4.4 Other information

- CAUTION ! First aid personnel must be aware of own risk during rescue !

## Section 5 - Firefighting Measures

### 5.1 Extinguishing media

#### Suitable Extinguishing Media

- Sand.  
Metal fire Powders.

#### Unsuitable Extinguishing Media

- DO NOT use water if avoidable.

#### Firefighting Procedures

- Confining and smothering metal fires is preferable rather than applying water. Corrosive substances in contact with metals may produce flammable hydrogen gas.

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

#### Unusual Fire and Explosion Hazards

- Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

#### Hazardous Combustion Products

- Fire or high temperature may create : Toxic gases/vapours/fumes of metal oxides or oxides.

### 5.3 Advice for firefighters

- Do not allow to enter drains, sewers or watercourses.  
Dike and collect extinguishing water.

Fire fighters should wear complete protective clothing including self-contained breathing apparatus.

## Section 6 - Accidental Release Measures

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

#### Personal Precautions

- Warn everybody of potential hazards and evacuate if necessary. Avoid breathing vapors, dust, or spray mist. Avoid contact with skin and eyes. Wear protective clothing as described in Section 8 of this safety data sheet.

#### Emergency Procedures

- Avoid generation and spreading dust. Do not allow to enter drains, sewers or watercourses.

### 6.2 Environmental precautions

- Avoid discharge into drains, water courses or onto the ground. Dike and collect extinguishing water. Avoid generation and spreading dust.

### 6.3 Methods and material for containment and cleaning up

#### Containment/Clean-up Measures

- Allow product to cool/solidify and pick up as a solid. Avoid generating dust. Collect powder using special dust vacuum cleaner with particle filter or carefully sweep into closed container. Ensure that waste and contaminated materials are collected and removed from the work area as soon as possible in a suitably labelled container. For waste disposal, see section 13.

### 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

- Avoid handling which leads to dust formation. Avoid inhalation of dust and contact with skin and eyes. Avoid excessive heat for prolonged period of time. Do not handle broken packages without protective equipment. Good personal hygiene is necessary. Wash hands and contaminated areas with water and soap before leaving the work site. Change work clothing daily before leaving the work place. Wash contaminated clothing before reuse. Provide eye wash fountain in work area. have emergency shower available.

### 7.2 Conditions for safe storage, including any incompatibilities

#### Storage

- Store in a cool, dry, well-ventilated place. Keep at a temperature not exceeding 30°C.

#### Incompatible Materials or Ignition Sources

- Do not store together with foodstuffs. Keep away from reducing agents such as zinc, alkali metals, and formic acid.

### 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 |        |                 |                                                      |                 |                 |                 |
|----------------------------|--------|-----------------|------------------------------------------------------|-----------------|-----------------|-----------------|
|                            | Result | ACGIH           | Austria                                              | Belgium         | Canada Ontario  | Canada Quebec   |
|                            | MAKs   | Not established | 0.1 mg/m <sup>3</sup> TWA [TMW] (inhalable fraction) | Not established | Not established | Not established |

|                                            |               |                            |                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                           |                                                                                                                                                                                                |
|--------------------------------------------|---------------|----------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Selenium<br>(7782-49-2)                    | STELs         | Not established            | 0.3 mg/m <sup>3</sup> STEL<br>[KZW] (inhalable<br>fraction, 4 X 15 min) | Not established                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Not established                                           | Not established                                                                                                                                                                                |
|                                            | TWAs          | 0.2 mg/m <sup>3</sup> TWA  | Not established                                                         | 0.2 mg/m <sup>3</sup> TWA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.2 mg/m <sup>3</sup> TWA                                 | 0.2 mg/m <sup>3</sup> TWAEV                                                                                                                                                                    |
| <b>Exposure Limits/Guidelines (Con't.)</b> |               |                            |                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                           |                                                                                                                                                                                                |
|                                            | <b>Result</b> | <b>China</b>               | <b>Denmark</b>                                                          | <b>Finland</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Germany DFG</b>                                        | <b>Germany TRGS</b>                                                                                                                                                                            |
| Selenium<br>(7782-49-2)                    | STELs         | 0.3 mg/m <sup>3</sup> STEL | Not established                                                         | 0.3 mg/m <sup>3</sup> STEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Not established                                           | Not established                                                                                                                                                                                |
|                                            | TWAs          | 0.1 mg/m <sup>3</sup> TWA  | 0.1 mg/m <sup>3</sup> TWA                                               | 0.1 mg/m <sup>3</sup> TWA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Not established                                           | 0.05 mg/m <sup>3</sup> TWA<br>AGW (The risk of<br>damage to the<br>embryo or fetus can<br>be excluded when<br>AGW and BGW<br>values are observed,<br>inhalable fraction,<br>exposure factor 1) |
|                                            | Ceilings      | Not established            | Not established                                                         | Not established                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.16 mg/m <sup>3</sup> Peak<br>(inhalable fraction)       | Not established                                                                                                                                                                                |
|                                            | MAKs          | Not established            | Not established                                                         | Not established                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.02 mg/m <sup>3</sup> TWA<br>MAK (inhalable<br>fraction) | Not established                                                                                                                                                                                |
| <b>Exposure Limits/Guidelines (Con't.)</b> |               |                            |                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                           |                                                                                                                                                                                                |
|                                            | <b>Result</b> | <b>Ireland</b>             | <b>Malaysia</b>                                                         | <b>Manufacturer</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>NIOSH</b>                                              | <b>Poland</b>                                                                                                                                                                                  |
| Selenium (<1mm<br>diameter)<br>(7782-49-2) | TWAs          | 0.1 mg/m <sup>3</sup> TWA  | 0.2 mg/m <sup>3</sup> TWA                                               | Not established                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.2 mg/m <sup>3</sup> TWA                                 | 0.1 mg/m <sup>3</sup> TWA<br>[NDS]                                                                                                                                                             |
|                                            | STELs         | Not established            | Not established                                                         | Not established                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Not established                                           | 0.3 mg/m <sup>3</sup> STEL<br>[NDSch]                                                                                                                                                          |
|                                            | DNEL          | Not established            | Not established                                                         | 7 mg/kg DNEL ,<br>Workers; hazard via<br>dermal route:<br>systemic effects; long<br>term; mg/kg bw/day<br>.05 mg/m <sup>3</sup> DNEL ,<br>Workers; hazard via<br>inhalation route:<br>systemic effects; long<br>term<br>.0043 mg/kg DNEL ,<br>General population;<br>hazard via oral route:<br>systemic effects; long<br>term; mg/kg bw/day<br>4.3 mg/kg DNEL ,<br>General population;<br>hazard via dermal<br>route: systemic<br>effects; long term;<br>mg/kg bw/day<br>.015 mg/m <sup>3</sup> DNEL ,<br>General population;<br>hazard via inhalation<br>route: systemic<br>effects; long term | Not established                                           | Not established                                                                                                                                                                                |
|                                            |               |                            |                                                                         | 2.67 µg/L PNEC ,<br>Aqua (freshwater)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                           |                                                                                                                                                                                                |

|                                     |        |                             |                       | 2 µg/L PNEC , Aqua (marinewater)<br>5.5 µg/L PNEC , Aqua (intermittent releases)<br><br>8.2 mg/kg PNEC , Sediment (freshwater); mg/kg sediment dw<br>6.2 mg/kg PNEC , Sediment (marinewater); mg/kg sediment dw<br>.1 mg/kg PNEC , Soil; mg/kg soil dw<br>1500 µg/L PNEC , STP |                            |                                           |
|-------------------------------------|--------|-----------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|
|                                     | PNEC   | Not established             | Not established       |                                                                                                                                                                                                                                                                                | Not established            | Not established                           |
| Exposure Limits/Guidelines (Con't.) |        |                             |                       |                                                                                                                                                                                                                                                                                |                            |                                           |
|                                     | Result | Portugal                    | Russia                | Spain                                                                                                                                                                                                                                                                          | Sweden                     | Switzerland                               |
| Selenium (7782-49-2)                | MAKs   | Not established             | Not established       | Not established                                                                                                                                                                                                                                                                | Not established            | 0.02 mg/m3 TWA [MAK] (inhalable)          |
|                                     | STELs  | Not established             | Not established       | Not established                                                                                                                                                                                                                                                                | Not established            | 0.16 mg/m3 STEL [KZW] (inhalable, 4 X 15) |
|                                     | TWAs   | 0.2 mg/m3 TWA [VLE-MP]      | 2 mg/m3 TWA (aerosol) | 0.1 mg/m3 TWA [VLA-ED]                                                                                                                                                                                                                                                         | 0.1 mg/m3 LLV (total dust) | Not established                           |
| Exposure Limits/Guidelines (Con't.) |        |                             |                       |                                                                                                                                                                                                                                                                                |                            |                                           |
|                                     | Result | United Kingdom              |                       |                                                                                                                                                                                                                                                                                |                            |                                           |
| Selenium (7782-49-2)                | STELs  | 0.3 mg/m3 STEL (calculated) |                       |                                                                                                                                                                                                                                                                                |                            |                                           |
|                                     | TWAs   | 0.1 mg/m3 TWA               |                       |                                                                                                                                                                                                                                                                                |                            |                                           |

## Exposure Control Notations

### Switzerland

•Selenium (7782-49-2): **Developmental Risk Groups:** (Developmental Risk Group C) | **Skin:** (skin notation)

### Germany DFG

•Selenium (7782-49-2): **Carcinogens:** (Category 3B (could be carcinogenic for man)) | **Pregnancy:** (no risk to embryo/fetus if exposure limits adhered to) | **Skin:** (skin notation)

## Exposure Limits Supplemental

### Switzerland

•Selenium (7782-49-2): **Biological Limit Values:** (150 µg/L Medium: serum Time: no restrictions Parameter: Selenium)

### Spain

•Selenium (7782-49-2): **Under Review:** (0.2 mg/m3 VLA-ED)

### ACGIH

•Selenium (7782-49-2): **TLV Basis - Critical Effects:** (eye and upper respiratory tract irritation)

## 8.2 Exposure controls

### Engineering Measures/Controls

- Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. Ensure that dust handling systems (such as exhaust ducts, dust collectors, vessels and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is not leakage from the equipment).

### Personal Protective Equipment

**Pictograms****Respiratory**

- In case of insufficient ventilation, wear suitable respiratory equipment. Recommended: FP3.

**Eye/Face**

- Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If operating conditions cause high dust concentrations to be produced, use dust goggles. Recommended ; safety glasses with side-shields.

**Hands**

- Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Appropriate material: neoprene.

**Skin/Body**

- Wear suitable protective clothing as protection against splashing or contamination. Recommended: Acid-resistant protective clothing.

**Thermal hazards**

- The molten product can causes serious burns.

**General Industrial Hygiene Considerations**

- Handle in accordance with good industrial hygiene and safety practice. When using do not smoke or eat. Wash hands before eating, drinking, or smoking. Change work clothing daily before leaving work place. Wash contaminated clothing before reuse.

**Environmental Exposure Controls**

- Avoid release to the environment. Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

## Section 9 - Physical and Chemical Properties

### 9.1 Information on Physical and Chemical Properties

| Material Description              |                                                            |                           |                                             |
|-----------------------------------|------------------------------------------------------------|---------------------------|---------------------------------------------|
| Physical Form                     | Solid                                                      | Appearance/Description    | Powder, dust.                               |
| Color                             | Grey                                                       | Odor                      | Odorless                                    |
| Organic/Inorganic                 | Inorganic                                                  |                           |                                             |
| General Properties                |                                                            |                           |                                             |
| Boiling Point                     | 685 C(1265 F)                                              | Melting Point             | 220.8 C(429.44 F)<br>@ 1013.25hPa           |
| Specific Gravity/Relative Density | 4.809 Water=1                                              | Water Solubility          | Insoluble 0.0038 mg/L @ 21.2 C<br>(70.16 F) |
| Explosive Properties              | Classification criteria not met.                           | Oxidizing Properties:     | Classification criteria not met.            |
| Volatility                        |                                                            |                           |                                             |
| Vapor Pressure                    | 0.0013 hPa @ 20 C(68 F)                                    |                           |                                             |
| Flammability                      |                                                            |                           |                                             |
| Autoignition                      | > 400 C(> 752 F)<br>Product is not self-igniting (EC A.16) | Flammability (solid, gas) | Classification criteria not met.            |
| Environmental                     |                                                            |                           |                                             |
| Bioconcentration Factor           | 944                                                        |                           |                                             |

### 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

- Not relevant.

## 10.4 Conditions to avoid

- Excess heat.

## 10.5 Incompatible materials

- Strong acids, strong reducing agents.

## 10.6 Hazardous decomposition products

- No hazardous decomposition products known.

# Section 11 - Toxicological Information

## 11.1 Information on toxicological effects

| Selenium (<1mm diameter) 7782-49-2 |              |                |                                                                                                                                           |           |         |            |               |          |
|------------------------------------|--------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------|------------|---------------|----------|
| Test Type                          | Dosage       | Route          | Species                                                                                                                                   | Duration  | Results | Test Class | Target Organs | Comments |
| Acute Toxicity                     | = 5000 mg/kg | Ingestion/Oral | Rat                                                                                                                                       | NDA       | LDLo    | NDA        | NDA           | NDA      |
| Acute Toxicity                     | = 5.67 mg/L  | Inhalation     | Rat                                                                                                                                       | 4 Hour(s) | LCLo    | NDA        | NDA           | NDA      |
| GHS Properties                     |              |                | Classification                                                                                                                            |           |         |            |               |          |
| Acute toxicity                     |              |                | EU/CLP • Acute Toxicity - Inhalation 3; Acute Toxicity - Oral 3<br>OSHA HCS 2012 • Acute Toxicity - Inhalation 3; Acute Toxicity - Oral 3 |           |         |            |               |          |
| Aspiration Hazard                  |              |                | EU/CLP • Data lacking<br>OSHA HCS 2012 • Data lacking                                                                                     |           |         |            |               |          |
| Carcinogenicity                    |              |                | EU/CLP • Data lacking<br>OSHA HCS 2012 • Data lacking                                                                                     |           |         |            |               |          |
| Germ Cell Mutagenicity             |              |                | EU/CLP • Data lacking<br>OSHA HCS 2012 • Data lacking                                                                                     |           |         |            |               |          |
| Skin corrosion/Irritation          |              |                | EU/CLP • Data lacking<br>OSHA HCS 2012 • Data lacking                                                                                     |           |         |            |               |          |
| Skin sensitization                 |              |                | EU/CLP • Data lacking<br>OSHA HCS 2012 • Data lacking                                                                                     |           |         |            |               |          |
| STOT-RE                            |              |                | EU/CLP • Specific Target Organ Toxicity Repeated Exposure 2<br>OSHA HCS 2012 • Specific Target Organ Toxicity Repeated Exposure 2         |           |         |            |               |          |
| STOT-SE                            |              |                | EU/CLP • Data lacking<br>OSHA HCS 2012 • Data lacking                                                                                     |           |         |            |               |          |
| Toxicity for Reproduction          |              |                | EU/CLP • Data lacking<br>OSHA HCS 2012 • Data lacking                                                                                     |           |         |            |               |          |
| Respiratory sensitization          |              |                | EU/CLP • Data lacking<br>OSHA HCS 2012 • Data lacking                                                                                     |           |         |            |               |          |
| Serious eye damage/Irritation      |              |                | EU/CLP • Data lacking<br>OSHA HCS 2012 • Data lacking                                                                                     |           |         |            |               |          |

## Potential Health Effects

### Inhalation

- Acute (Immediate)**
  - Exposure to dust may cause irritation. May cause coughing and difficulties in breathing. Vapours may cause headache, fatigue, dizziness and nausea.
- Chronic (Delayed)**
  - Repeated and prolonged exposure may affect the lungs and respiratory system.

### Skin

- Acute (Immediate)**
  - No specific symptoms noted. The molten product can cause serious burns. Exposure to dust may cause mechanical irritation.
- Chronic (Delayed)**
  - Under normal conditions of use, no health effects are expected. Repeated and prolonged exposure may cause redness and irritation.

### Eye

- Acute (Immediate)**
  - No specific symptoms noted. Excessive concentrations of nuisance dust in the workplace may reduce visibility and may cause unpleasant deposits in eyes. Adverse symptoms may include the following : irritation, watering, redness.
- Chronic (Delayed)**
  - Under normal conditions of use, no health effects are expected. Repeated or prolonged exposure to corrosive materials or fumes may cause conjunctivitis.

### Ingestion

- Acute (Immediate)**
  - Metallic taste. May cause stomach pain or vomiting.
- Chronic (Delayed)**
  - Under normal conditions of use, no health effects are expected. Repeated or prolonged exposure to corrosive materials or fumes may cause gastrointestinal disturbances.

## Section 12 - Ecological Information

### 12.1 Toxicity

| Selenium (<1mm diameter) |                                                         |             | 7782-49-2 |                                                                               |                             |
|--------------------------|---------------------------------------------------------|-------------|-----------|-------------------------------------------------------------------------------|-----------------------------|
| Dosage                   | Species                                                 | Duration    | Results   | Exposure Conditions                                                           | Comments                    |
| > 100 mg/L               | <b>Fish:</b> oncorhynchus mykiss                        | 96 Hour (s) | LC50      | semi-static; Hardness 1.1 mmol/l; Temperature 14.5-14.9°C; pH 8.1-8.6         | NDA                         |
| >= 10 mg/L               | <b>Fish:</b> oncorhynchus mykiss                        | 28 Day(s)   | NOEC      | semi-static; Hardness 12-1.3 mmol/l; Temperature 14.5-15.3°C; pH 7.6-8.6      | NDA                         |
| > 100 mg/L               | <b>Crustacea:</b> Daphnia magna                         | 48 Hour (s) | EC50      | static; freshwater; Hardness 1.1mmol/l; Temperature 20.6-20.3°C; pH 7.76-8.24 | nominal                     |
| >= 100 mg/L              | <b>Crustacea:</b> Daphnia magna                         | 21 Day(s)   | NOEC      | semi-static; Hardness 1.1 mmol/l; Temperature 19.9-21.1°C; pH 7.63-9.44       | nominal                     |
| > 1.73 µg/L              | <b>Aquatic Plant(s):</b> pseudokirchnerella subcapitata | 72 Hour (s) | EC50      | static; freshwater; Temperature 20.5°C; pH 8.27-7.88                          | µg Selenium/l (growth rate) |

- The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

### 12.2 Persistence and degradability

- The products solely consists of inorganic compounds which are not biodegradable.

### 12.3 Bioaccumulative potential

- Bioaccumulation is unlikely to be significant because of the low water solubility of this product.

### 12.4 Mobility in Soil

- Not considered mobile but soluble compounds may be produced by acidic conditions.

### 12.5 Results of PBT and vPvB assessment

- The PBT and vPvB criteria of Annex XIII to regulation (EC) 1907/2006 does not apply to

inorganic substances.

## 12.6 Other adverse effects

- No studies have been found.

## Section 13 - Disposal Considerations

### 13.1 Waste treatment methods

#### Product waste

- Recover, reclaim or recycle if practical. Refer to manufacturer/supplier for information on recovery/recycling.

#### Packaging waste

- Contaminated packaging should be emptied as far as possible and after appropriate cleansing may be taken for reuse. Packaging that cannot be cleaned should be disposed of in agreement with regional waste disposal company.

### 13.2 Other Information

- When handling waste, consideration should be made to the safety precautions applied to handling of this product.

## Section 14 - Transport Information

|           | 14.1 UN number | 14.2 UN proper shipping name | 14.3 Transport hazard class(es) | 14.4 Packing group | 14.5 Environmental hazards |
|-----------|----------------|------------------------------|---------------------------------|--------------------|----------------------------|
| DOT       | NDA            | NDA                          | NDA                             | NDA                | NDA                        |
| TDG       | NDA            | NDA                          | NDA                             | NDA                | NDA                        |
| IMO/IMDG  | NDA            | NDA                          | NDA                             | NDA                | NDA                        |
| ADR/RID   | NDA            | NDA                          | NDA                             | NDA                | NDA                        |
| IATA/ICAO | NDA            | NDA                          | NDA                             | NDA                | NDA                        |

#### 14.6 Special precautions for user

- No special precautions.

#### 14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

- Not relevant.

#### 14.8 Other information

- The product is not covered by international regulations on the transport of dangerous goods.

## Section 15 - Regulatory Information

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

#### SARA Hazard Classifications

- No data available

| State Right To Know |           |     |     |     |
|---------------------|-----------|-----|-----|-----|
| Component           | CAS       | MA  | NJ  | PA  |
| Selenium            | 7782-49-2 | Yes | Yes | Yes |

| Inventory |           |                |            |       |           |            |
|-----------|-----------|----------------|------------|-------|-----------|------------|
| Component | CAS       | Australia AICS | Canada DSL | China | EU EINECS | Korea KECL |
| Selenium  | 7782-49-2 | Yes            | Yes        | Yes   | Yes       | Yes        |

| Inventory (Con't.) |           |      |
|--------------------|-----------|------|
| Component          | CAS       | TSCA |
| Selenium           | 7782-49-2 | Yes  |

## Australia

### Labor

#### Australia - List of Designated Hazardous Substances - Classification

|            |           |                    |
|------------|-----------|--------------------|
| • Selenium | 7782-49-2 | T R23/25, R33, R53 |
|------------|-----------|--------------------|

### Environment

#### Australia - National Pollutant Inventory (NPI) Substance List

|            |           |                                                           |
|------------|-----------|-----------------------------------------------------------|
| • Selenium | 7782-49-2 | 10 tonne/yr Threshold category 1 (Selenium and compounds) |
|------------|-----------|-----------------------------------------------------------|

## Canada

### Labor

#### Canada - WHMIS - Classifications of Substances

|            |           |                                                                                                       |
|------------|-----------|-------------------------------------------------------------------------------------------------------|
| • Selenium | 7782-49-2 | Uncontrolled product according to WHMIS classification criteria (including amorphous and crystalline) |
|------------|-----------|-------------------------------------------------------------------------------------------------------|

#### Canada - WHMIS - Ingredient Disclosure List

|            |           |       |
|------------|-----------|-------|
| • Selenium | 7782-49-2 | 0.1 % |
|------------|-----------|-------|

## Europe

### Other

#### EU - CLP (1272/2008) - Annex VI - Table 3.2 - Classification

|            |           |                   |
|------------|-----------|-------------------|
| • Selenium | 7782-49-2 | T; R23/25 R33 R53 |
|------------|-----------|-------------------|

#### EU - CLP (1272/2008) - Annex VI - Table 3.2 - Labelling

|            |           |                                        |
|------------|-----------|----------------------------------------|
| • Selenium | 7782-49-2 | T R:23/25-33-53 S:(1/2)-20/21-28-45-61 |
|------------|-----------|----------------------------------------|

#### EU - CLP (1272/2008) - Annex VI - Table 3.2 - Safety Phrases

|            |           |                        |
|------------|-----------|------------------------|
| • Selenium | 7782-49-2 | S:(1/2)-20/21-28-45-61 |
|------------|-----------|------------------------|

## Germany

### Environment

#### Germany - TA Luft - Types and Classes

|            |           |                                           |
|------------|-----------|-------------------------------------------|
| • Selenium | 7782-49-2 | inorganic dust Substance: 5.2.2, Class II |
|------------|-----------|-------------------------------------------|

#### Germany - TA Luft - Emission Limits for Inorganic Dusts

|            |           |                                                                          |
|------------|-----------|--------------------------------------------------------------------------|
| • Selenium | 7782-49-2 | 2.5 g/h Mass flow (Class II);<br>0.5 mg/m3 Mass concentration (Class II) |
|------------|-----------|--------------------------------------------------------------------------|

#### Germany - Water Classification (VwVwS) - Annex 3

|            |           |                                                   |
|------------|-----------|---------------------------------------------------|
| • Selenium | 7782-49-2 | ID Number 2751, hazard class 2 - hazard to waters |
|------------|-----------|---------------------------------------------------|

## Malaysia

### Labor

#### Malaysia - Occupational Safety & Health - Risk Phrases

|            |           |               |
|------------|-----------|---------------|
| • Selenium | 7782-49-2 | R-23/25, R-33 |
|------------|-----------|---------------|

#### Malaysia - Occupational Safety & Health - Safety Phrases

|            |           |                     |
|------------|-----------|---------------------|
| • Selenium | 7782-49-2 | S-20/21, S-28, S-44 |
|------------|-----------|---------------------|

#### Malaysia - Occupational Safety & Health Conc. Cut-Offs for Harmful Category

|            |           |                                                                                                                 |
|------------|-----------|-----------------------------------------------------------------------------------------------------------------|
| • Selenium | 7782-49-2 | 3.0 % (ingredient to be classified with R20 instead of R23 and/or R21 instead of R24 and/or R22 instead of R25) |
|------------|-----------|-----------------------------------------------------------------------------------------------------------------|

#### Malaysia - Occupational Safety & Health Conc. Cut-Offs for Toxic Category

|            |           |                                                                                              |
|------------|-----------|----------------------------------------------------------------------------------------------|
| • Selenium | 7782-49-2 | 25.0 % (above this concentration ingredient to be classified with R23 and/or R24 and/or R25) |
|------------|-----------|----------------------------------------------------------------------------------------------|

### Environment

#### Malaysia - Environmental Quality (Industrial Effluent) Regulations - Fifth and Eighth Schedules

|            |           |                                           |
|------------|-----------|-------------------------------------------|
| • Selenium | 7782-49-2 | 0.02 mg/L Standard A; 0.5 mg/L Standard B |
|------------|-----------|-------------------------------------------|

## United Kingdom

### Environment

#### United Kingdom - Pollution Inventory - Schedule 1 - Thresholds for Releases to Air

|            |           |        |
|------------|-----------|--------|
| • Selenium | 7782-49-2 | 100 kg |
|------------|-----------|--------|

## United States

### Environment

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

|            |           |                                                                                                                                                                                                                                                                                                                   |
|------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| • Selenium | 7782-49-2 | 100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm) |
|------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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

|            |           |                                |
|------------|-----------|--------------------------------|
| • Selenium | 7782-49-2 | 1.0 % de minimis concentration |
|------------|-----------|--------------------------------|

#### U.S. - RCRA (Resource Conservation & Recovery Act) - Basis for Listing - Appendix VII

|            |           |                                |
|------------|-----------|--------------------------------|
| • Selenium | 7782-49-2 | Included in waste stream: F039 |
|------------|-----------|--------------------------------|

#### U.S. - RCRA (Resource Conservation & Recovery Act) - Constituents for Detection Monitoring

|            |           |         |
|------------|-----------|---------|
| • Selenium | 7782-49-2 | (total) |
|------------|-----------|---------|

**U.S. - RCRA (Resource Conservation & Recovery Act) - D Series Wastes - Max Conc of Contaminants for the Tox Characteristic**

• Selenium 7782-49-2 1.0 mg/L regulatory level

**U.S. - RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261**

• Selenium 7782-49-2 hazardous constituent - no waste number

**U.S. - RCRA (Resource Conservation & Recovery Act) - List for Hazardous Constituents**

• Selenium 7782-49-2 (total)

**U.S. - RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards**

• Selenium 7782-49-2 0.82 mg/L (wastewater); 5.7 mg/L TCLP (nonwastewater)

**U.S. - RCRA (Resource Conservation & Recovery Act) - TSD Facilities Ground Water Monitoring**

• Selenium 7782-49-2 (total)

**United States - Pennsylvania****Labor****U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List**

• Selenium 7782-49-2

**15.2 Chemical Safety Assessment**

- A chemical safety assessment has been carried out for this product.

**Section 16 - Other Information**

| Revision Summary |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date             | MSDS No. | Changes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 03/March/2014    |          | <ul style="list-style-type: none"> <li>• Section 1 changed. Addition of further uses.</li> <li>• Section 2 changed. Updated label elements.</li> <li>• Section 4 changed. Added further information.</li> <li>• Section 5 changed. Updated suitable extinguishing media.</li> <li>• Section 7 changed. Added further information.</li> <li>• Section 8 changed. Added recommendations to hand protection, respiratory protection, and skin/body protection.</li> <li>• Section 9 changed. Added bioconcentration factor. Edited melting point, water solubility and vapor pressure to be consistent with information submitted under Regulation (EC) 1907/2006.</li> <li>• Section 10 changed. Updated information to be consistent with information submitted under Regulation (EC) 1907/2006.</li> <li>• Section 13 changed. Updated information for waste packaging.</li> </ul> |

**Classification method for mixtures**

- Calculation method.

**Training advice**

- Chemical hazard awareness training, incorporating labelling, safety data sheets, personal protective equipment and good hygiene measures. Chemical incident response training. First aid for chemical exposure including use of eye wash and safety showers. Use of personal protective equipment, including selection, compatibility, maintenance, standards and fit.

**Last Revision Date**

- 18/February/2014

**Preparation Date**

- 04/February/2014

**Other Information**

- Information Sources : US-EPA Ecotox databases Hazardous Substance Data Bank

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(HSDB®) eChemPortal Handbook of chemistry and Physics 91st Edition, W.M. Haynes NIOSH RTECS ® databases (Registry of Toxic Effects of Chemical Substances) European Chemicals Agency (ECHA) databases.

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