SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier
Product Name: Molybdenum diselenide few-layer film on SiO2/Si
Synonyms: Molybdenum (IV) selenide, Molybdenum selenide
Chemical Name: Molybdenum diselenide
Chemical Formula: MoSe2
Product code: M2170
CAS No.: 12058-18-3
EC No.: 235-027-9
REACH Registration No.: Not applicable.

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified Use(s): PC21 Laboratory chemicals

1.3 Details of the supplier of the safety data sheet
Company Identification: Ossila Limited
Address of Supplier: Solpro Business Park
Windsor Street
Sheffield
Postal code: S4 7WB, UK
Telephone: +441142999180
E-mail: info@ossila.com
Office hours: 08:00 - 17:00

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Acute Tox. 3: Toxic if swallowed.
Acute Tox. 3: Toxic if inhaled.
STOT RE 2: May cause damage to organs through prolonged or repeated exposure.
Aquatic Chronic 1: Very toxic to aquatic life with long lasting effects.

2.2 Label elements
According to Regulation (EC) No. 1272/2008 (CLP)
Product Name: Molybdenum diselenide few-layer film on SiO2/Si
Hazard Pictogram(s):
- GHS06
- GHS08
- GHS09
Signal Word(s): Danger
Hazard Statement(s):
H301 + H331: Toxic if swallowed or if inhaled.
H373: May cause damage to organs through prolonged or repeated exposure.
H410: Very toxic to aquatic life with long lasting effects.
Precautionary Statement(s):
P260: Do not breathe dust/fume/gas/mist/vapours/spray.
P304 + P340 + P311: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician.

2.3 Other hazards
None known.

2.4 Additional Information
Not applicable.
SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

<table>
<thead>
<tr>
<th>HAZARDOUS INGREDIENT(S)</th>
<th>CAS No.</th>
<th>EC No. / REACH Registration No.</th>
<th>% W/W</th>
<th>Hazard Statement(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon</td>
<td>7440-21-3</td>
<td>235-027-9</td>
<td>&gt;99</td>
<td>Not classified</td>
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<tr>
<td>Silicon dioxide</td>
<td>7631-86-9</td>
<td></td>
<td>&lt;0.1</td>
<td>Acute Tox. 3 H301</td>
</tr>
<tr>
<td>Molybdenum Diselenide</td>
<td>12058-18-3</td>
<td></td>
<td>&lt;0.1</td>
<td>Acute Tox. 3 H331</td>
</tr>
</tbody>
</table>

3.2 Mixtures

Not applicable.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

**Inhalation**
Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician.

**Skin Contact**
Rinse skin with water. If skin irritation occurs, get medical advice/attention.

**Eye Contact**
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

**Ingestion**
Immediately call a POISON CENTER or doctor/physician. Rinse mouth.

4.2 Most important symptoms and effects, both acute and delayed

SECTION 11: Most important symptoms and effects, both acute and delayed

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable Extinguishing media As appropriate for surrounding fire.

Unsuitable extinguishing media As appropriate for surrounding fire.

5.2 Special hazards arising from the substance or mixture

May decompose in a fire, giving off toxic and irritant vapours.

5.3 Advice for firefighters

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

Provide adequate ventilation. Wear protective clothing as per section 8.

6.2 Environmental precautions

Avoid release to the environment.

6.3 Methods and material for containment and cleaning up

Sweep up spilled substance but avoid making dust. Use vacuum equipment for collecting spill materials, where practicable. Dispose of contents in accordance with local, state or national legislation.

6.4 Reference to other sections

See Also Section 8, 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid breathing dust/aerosols. Use only in a well-ventilated area. Wear protective clothing as per section 8.

7.2 Conditions for safe storage, including any incompatibilities

Store in a well-ventilated place. Keep container tightly closed. Store locked up.

Storage temperature
Ambient

Storage life
Stable under normal conditions.

Incompatible materials
None known.

7.3 Specific end use(s)

Not known. See Section: 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Occupational Exposure Limits
### Occupational Exposure Limits

<table>
<thead>
<tr>
<th>SUBSTANCE.</th>
<th>CAS No.</th>
<th>LTEL (8 hr TWA ppm)</th>
<th>LTEL (8 hr TWA mg/m³)</th>
<th>STEL (ppm)</th>
<th>STEL (mg/m³)</th>
<th>Note</th>
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<tr>
<td>Molybdenum compounds (as Mo) insoluble compounds</td>
<td>7440-21-3</td>
<td>10</td>
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<td></td>
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<td></td>
<td>7631-96-9</td>
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<tr>
<td></td>
<td>12058-18-3</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>Source</th>
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<tbody>
<tr>
<td>EU</td>
<td>EU Occupational Exposure Limits</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>UK Workplace Exposure Limits EH40/2005 (Third edition, published 2018)</td>
</tr>
</tbody>
</table>

#### 8.2 Exposure controls

8.2.1. Appropriate engineering controls

Ensure adequate ventilation. A washing facility/water for eye and skin cleaning purposes should be present.

8.2.2. Personal protection equipment

- **Eye Protection**: Wear eye protection with side protection (EN166).
- **Skin protection**: Wear protective clothing and gloves: Impervious gloves (EN 374).
- **Respiratory protection**: A suitable mask with filter type A (EN14387 or EN405) may be appropriate.
- **Thermal hazards**: None known.

8.2.3. Environmental Exposure Controls

Avoid release to the environment.

### SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1 Information on basic physical and chemical properties

- **Appearance**: Film
- **Colour**: Transparent
- **Odour**: Not known.
- **Odour threshold**: Not known.
- **pH**: Not known.
- **Melting point/freezing point**: Not known.
- **Initial boiling point and boiling range**: Not known.
- **Flash Point**: Not known.
- **Evaporation rate**: Not known.
- **Flammability (solid, gas)**: Not known.
- **Upper/lower flammability or explosive limits**: Not known.
- **Vapour pressure**: Not known.
- **Vapour density**: Not known.
- **Density (g/ml)**: Not known.
- **Relative density**: Not known.
- **Solubility(ies)**: Solubility (Water): Not known. Solubility (Other): Not known.
- **Partition coefficient: n-octanol/water**: Not known.
- **Auto-ignition temperature**: Not known.
- **Decomposition Temperature (°C)**: Not known.
- **Viscosity**: Not known.
- **Explosive properties**: Not known.
- **Oxidising properties**: Not known.

#### 9.2 Other information

None.
SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity
None anticipated.

10.2 Chemical Stability
Stable under normal conditions.

10.3 Possibility of hazardous reactions
Not known.

10.4 Conditions to avoid
Not known.

10.5 Incompatible materials
Not known.

10.6 Hazardous decomposition products
No hazardous decomposition products known.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects
Acute toxicity - Ingestion
Self classification: Toxic if swallowed.

Acute toxicity - Skin Contact
Not classified.

Acute toxicity - Inhalation
Self classification: Toxic if inhaled.

Skin corrosion/irritation
Not classified.

Serious eye damage/irritation
Not classified.

Skin sensitization data
Not classified.

Respiratory sensitization data
Not classified.

Germ cell mutagenicity
Not classified.

Carcinogenicity
Not classified.

Reproductive toxicity
Not classified.

Lactation
Not classified.

STOT - single exposure
Not classified.

STOT - repeated exposure
Self classification: May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
Not classified.

11.2 Other information
Not known.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity
Very toxic to aquatic life with long lasting effects.

Toxicity - Aquatic invertebrates
Not known.

Toxicity - Fish
Not known.

Toxicity - Algae
Not known.

Toxicity - Sediment Compartment
Not classified.

Toxicity - Terrestrial Compartment
Not classified.

12.2 Persistence and Degradation
Not known.

12.3 Bioaccumulative potential
Not known.

12.4 Mobility in soil
Not known.

12.5 Results of PBT and vPvB assessment
Not known.

12.6 Other adverse effects
Not known.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
Dispose of contents in accordance with local, state or national legislation. Recycle only completely emptied packaging. Normal disposal is via incineration operated by an accredited disposal contractor. Send to a licensed recycler, reclaimer or incinerator.

13.2 Additional Information
Disposal should be in accordance with local, state or national legislation.

SECTION 14: TRANSPORT INFORMATION

14.1 UN number
UN No. 3283
14.2 UN proper shipping name
UN proper shipping name: Selenium compound, solid, n.o.s. (Molybdenum diselenide)

14.3 Transport hazard class(es)
<table>
<thead>
<tr>
<th>Class</th>
<th>ADR/RID</th>
<th>IMDG</th>
<th>IATA</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>6.1</td>
<td>6.1</td>
<td>6.1</td>
</tr>
</tbody>
</table>

14.4 Packing group
Packing group: III

14.5 Environmental hazards
Environmental hazards: Classified as a Marine Pollutant.

14.6 Special precautions for user
Not known.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code
Not known.

SECTION 15: REGULATORY INFORMATION

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

<table>
<thead>
<tr>
<th>Regulation/Restriction</th>
<th>Not listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Regulations - Authorisations and/or Restrictions On Use</td>
<td></td>
</tr>
<tr>
<td>High Concern for Authorisation</td>
<td></td>
</tr>
<tr>
<td>REACH: ANNEX XIV list of substances subject to authorisation</td>
<td>Not listed</td>
</tr>
<tr>
<td>REACH: Annex XVII Restrictions on the manufacture, placing on the market and use of certain substances, mixtures and articles</td>
<td>Not listed</td>
</tr>
<tr>
<td>Community Rolling Action Plan (CoRAP)</td>
<td>Not listed</td>
</tr>
<tr>
<td>Regulation (EC) N° 1005/2009 on substances that deplete the ozone layer</td>
<td>Not listed</td>
</tr>
<tr>
<td>National regulations</td>
<td>Not known.</td>
</tr>
</tbody>
</table>

15.2 Chemical Safety Assessment
A REACH chemical safety assessment has not been carried out.

SECTION 16: OTHER INFORMATION

The following sections contain revisions or new statements:

LEGEND

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADN</td>
<td>European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways</td>
</tr>
<tr>
<td>ADR</td>
<td>European Agreement concerning the International Carriage of Dangerous Goods by Road</td>
</tr>
<tr>
<td>CAS</td>
<td>Chemical Abstracts Service</td>
</tr>
<tr>
<td>CLP</td>
<td>Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures</td>
</tr>
<tr>
<td>DNEL</td>
<td>Derived No Effect Level</td>
</tr>
<tr>
<td>EC</td>
<td>European Community</td>
</tr>
<tr>
<td>EINECS</td>
<td>European Inventory of Existing Commercial Chemical Substances</td>
</tr>
<tr>
<td>IATA</td>
<td>International Air Transport Association</td>
</tr>
<tr>
<td>IBC</td>
<td>Intermediate Bulk Container</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
</tr>
<tr>
<td>IMDG</td>
<td>International Maritime Dangerous Goods</td>
</tr>
<tr>
<td>LTEL</td>
<td>Long term exposure limit</td>
</tr>
<tr>
<td>PBT</td>
<td>Persistent, Bioaccumulative and Toxic</td>
</tr>
<tr>
<td>PNEC</td>
<td>Predicted No Effect Concentration</td>
</tr>
<tr>
<td>REACH</td>
<td>Registration, Evaluation, Authorisation and Restriction of Chemicals</td>
</tr>
<tr>
<td>RID</td>
<td>Regulations concerning the International Carriage of Dangerous Goods by Rail</td>
</tr>
<tr>
<td>STEL</td>
<td>Short term exposure limit</td>
</tr>
<tr>
<td>STOT</td>
<td>Specific Target Organ Toxicity</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
</tbody>
</table>
vPvB : very Persistent and very Bioaccumulative

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