SAFETY DATA SHEET
Molybdenum Sulfide (pieces)

1. Identification

Product identifier

Product name Molybdenum Sulfide (pieces)
Internal identification Replaces M-2210-185
CAS number 1317-33-5

Recommended use of the chemical and restrictions on use

Application Physical vapor deposition of thin films
Uses advised against No specific uses advised against are identified.

Details of the supplier of the safety data sheet

Supplier Kurt J Lesker Company
Manufacturer Kurt J Lesker Company
1925 Route 51
Jefferson Hills, PA 15025
+1 412-387-9200

Kurt J Lesker Company LTD
United Kingdom
15-16 Burgess Road
Hastings, East Sussex, TN35 4NR
England
Customer Service: +44 (0) 1424 458100
msds@lesker.com

Emergency telephone number

Emergency telephone North America [USA, Canada, Mexico]: 1-866-519-4752
Mainland China: (+86) 4001 2001 74
Europe: (int'l call prefix)-1-760-476-3961
Asia Pacific: (int'l call prefix)-1-760-476-3960
Middle East & Africa: (int'l call prefix)-1-760-476-3959

2. Hazard(s) identification

Classification of the substance or mixture

Physical hazards Not Classified
Health hazards Not Classified
Environmental hazards Not Classified

Label elements

Hazard statements NC Not Classified

Other hazards
Molybdenum Sulfide (pieces)

This substance is not classified as PBT or vPvB according to current EU criteria.

3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Mixtures</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Molybdenum Sulfide (pieces)</strong></td>
<td>0 - 100%</td>
</tr>
<tr>
<td>CAS number: 1317-33-5</td>
<td></td>
</tr>
</tbody>
</table>

**Classification**  
Not Classified

The Full Text for all Hazard Statements are Displayed in Section 16.

**Composition comments**  
The exact percentage is withheld as a trade secret in accordance with 29 CFR 1910.1200.

4. First-aid measures

**Description of first aid measures**

**General information**  
If in doubt, get medical attention promptly. Show this Safety Data Sheet to the medical personnel.

**Inhalation**  
No specific recommendations. If throat irritation or coughing persists, proceed as follows. Move affected person to fresh air and keep warm and at rest in a position comfortable for breathing. Loosen tight clothing such as collar, tie or belt. Get medical attention if any discomfort continues.

**Ingestion**  
No specific recommendations. If throat irritation or coughing persists, proceed as follows. Rinse mouth. Get medical attention if any discomfort continues.

**Skin Contact**  
No specific recommendations. Rinse with water. Get medical attention if any discomfort continues.

**Eye contact**  
Rinse with water. Get medical attention if any discomfort continues.

**Protection of first aiders**  
Use protective equipment appropriate for surrounding materials.

**Most important symptoms and effects, both acute and delayed**

**General information**  
The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

**Inhalation**  
No specific symptoms known.

**Ingestion**  
No specific symptoms known. May cause discomfort if swallowed.

**Skin contact**  
Prolonged contact may cause dryness of the skin.

**Eye contact**  
No specific symptoms known. May be slightly irritating to eyes.

**Indication of immediate medical attention and special treatment needed**

**Notes for the doctor**  
Treat symptomatically.

**Specific treatments**  
No special treatment required.

5. Fire-fighting measures

**Extinguishing media**

**Suitable extinguishing media**  
The product is not flammable. Extinguish with alcohol-resistant foam, carbon dioxide, dry powder or water fog. Use fire-extinguishing media suitable for the surrounding fire.

**Unsuitable extinguishing media**  
Do not use water jet as an extinguisher, as this will spread the fire.
Molybdenum Sulfide (pieces)

Special hazards arising from the substance or mixture

Specific hazards
None known.

Hazardous combustion products
Thermal decomposition or combustion products may include the following substances:
Harmful gases or vapors.

Advice for firefighters

Protective actions during firefighting
Avoid breathing fire gases or vapors. Evacuate area. Cool containers exposed to heat with water spray and remove them from the fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for firefighters
Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing. Standard Firefighter's clothing including helmets, protective boots and gloves will provide a basic level of protection for chemical incidents.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal precautions
No specific recommendations. For personal protection, see Section 8.

Environmental precautions

Environmental precautions
Avoid discharge into drains or watercourses or onto the ground.

Methods and material for containment and cleaning up

Methods for cleaning up
Reuse or recycle products wherever possible. Collect spillage with a shovel and broom, or similar and reuse, if possible. Collect and place in suitable waste disposal containers and seal securely. Flush contaminated area with plenty of water. Wash thoroughly after dealing with a spillage. Dispose of contents/container in accordance with national regulations.

Reference to other sections
For personal protection, see Section 8.

7. Handling and storage

Precautions for safe handling

Usage precautions
Read and follow manufacturer's recommendations. Wear protective clothing as described in Section 8 of this safety data sheet. Keep away from food, drink and animal feeding stuffs. Keep container tightly sealed when not in use.

Advice on general occupational hygiene
Wash promptly if skin becomes contaminated. Take off contaminated clothing and wash before reuse. Wash contaminated clothing before reuse.

Conditions for safe storage, including any incompatibilities

Storage precautions
No specific recommendations.

Storage class
Unspecified storage.

Specific end uses(s)
The identified uses for this product are detailed in Section 1.2.

8. Exposure Controls/personal protection

Exposure controls

Appropriate engineering controls
No specific ventilation requirements.
Molybdenum Sulfide (pieces)

Eye/face protection
No specific eye protection required during normal use. Large Spillages: Eyewear complying with an approved standard should be worn if a risk assessment indicates eye contact is possible.

Hand protection
No specific hand protection recommended. Large Spillages: Wear protective gloves.

Hygiene measures
Wash hands thoroughly after handling. Wash at the end of each work shift and before eating, smoking and using the toilet. Do not eat, drink or smoke when using this product.

Respiratory protection
No specific recommendations. Provide adequate ventilation. Large Spillages: If ventilation is inadequate, suitable respiratory protection must be worn.

Environmental exposure controls
Not regarded as dangerous for the environment.

9. Physical and Chemical Properties

Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Solid.</td>
</tr>
<tr>
<td>Color</td>
<td>Various colors.</td>
</tr>
<tr>
<td>Odor</td>
<td>No characteristic odor.</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Melting point</td>
<td>Not available.</td>
</tr>
<tr>
<td>Initial boiling point and range</td>
<td>Not available.</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Upper/lower flammability or explosive limits</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>Not available.</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Relative density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Bulk density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Solubility(ies)</td>
<td>Insoluble in water.</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

10. Stability and reactivity

Reactivity
There are no known reactivity hazards associated with this product.
Molybdenum Sulfide (pieces)

Stability
Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions.

Possibility of hazardous reactions
No potentially hazardous reactions known.

Conditions to avoid
There are no known conditions that are likely to result in a hazardous situation.

Materials to avoid
No specific material or group of materials is likely to react with the product to produce a hazardous situation.

Hazardous decomposition products
Does not decompose when used and stored as recommended. Thermal decomposition or combustion products may include the following substances: Harmful gases or vapors.

11. Toxicological information
Information on toxicological effects

Toxicological effects
Not regarded as a health hazard under current legislation.

Acute toxicity - oral
Notes (oral LD₅₀)
Based on available data the classification criteria are not met.

Acute toxicity - dermal
Notes (dermal LD₅₀)
Based on available data the classification criteria are not met.

Acute toxicity - inhalation
Notes (inhalation LC₅₀)
Based on available data the classification criteria are not met.

Skin corrosion/irritation
Animal data
Based on available data the classification criteria are not met.

Serious eye damage/irritation
Based on available data the classification criteria are not met.

Respiratory sensitization
Based on available data the classification criteria are not met.

Skin sensitization
Based on available data the classification criteria are not met.

Germ cell mutagenicity
Genotoxicity - in vitro
Based on available data the classification criteria are not met.

Carcinogenicity
Based on available data the classification criteria are not met.

IARC carcinogenicity
None of the ingredients are listed or exempt.

Reproductive toxicity
Reproductive toxicity - fertility
Based on available data the classification criteria are not met.

Reproductive toxicity - development
Based on available data the classification criteria are not met.

Specific target organ toxicity - single exposure
STOT - single exposure
Not classified as a specific target organ toxicant after a single exposure.

Specific target organ toxicity - repeated exposure
Molybdenum Sulfide (pieces)

STOT - repeated exposure  Not classified as a specific target organ toxicant after repeated exposure.

Aspiration hazard  Not relevant. Solid.

General information  No specific health hazards known. The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

Inhalation  No specific symptoms known.

Ingestion  No specific symptoms known. May cause discomfort if swallowed.

Skin Contact  Prolonged contact may cause dryness of the skin.

Eye contact  No specific symptoms known. May be slightly irritating to eyes.

Route of entry  Ingestion Inhalation Skin and/or eye contact

Target Organs  No specific target organs known.

12. Ecological Information

Ecotoxicity  Not regarded as dangerous for the environment. However, large or frequent spills may have hazardous effects on the environment.

Toxicity  Based on available data the classification criteria are not met.

Persistence and degradability  The degradability of the product is not known.

Bioaccumulative potential  No data available on bioaccumulation.

Mobility in soil  No data available.

Mobility  Not applicable.

Other adverse effects  None known.

13. Disposal considerations

Waste treatment methods  The generation of waste should be minimized or avoided wherever possible. Reuse or recycle products wherever possible. This material and its container must be disposed of in a safe way.

Disposal methods  Dispose of surplus products and those that cannot be recycled via a licensed waste disposal contractor. Waste packaging should be collected for reuse or recycling. Incineration or landfill should only be considered when recycling is not feasible. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of the local water authority.

14. Transport information

General  The product is not covered by international regulations on the transport of dangerous goods (IMDG, IATA, DoT).
Molybdenum Sulfide (pieces)

**UN Number**
Not applicable.

**UN proper shipping name**
Not applicable.

**Transport hazard class(es)**
No transport warning sign required.

**Packing group**
Not applicable.

**Environmental hazards**
Environmentally Hazardous Substance
No.

**Special precautions for user**
Not applicable.

**Transport in bulk according to**
Not applicable.
Annex II of MARPOL 73/78
and the IBC Code

### 15. Regulatory information

#### US Federal Regulations

**SARA Section 302 Extremely Hazardous Substances Tier II Threshold Planning Quantities**
None of the ingredients are listed or exempt.

**CERCLA/Superfund, Hazardous Substances/Reportable Quantities (EPA)**
None of the ingredients are listed or exempt.

**SARA Extremely Hazardous Substances EPCRA Reportable Quantities**
None of the ingredients are listed or exempt.

**SARA 313 Emission Reporting**
None of the ingredients are listed or exempt.

**CAA Accidental Release Prevention**
None of the ingredients are listed or exempt.

**FDA - Essential Chemical**
None of the ingredients are listed or exempt.

**FDA - Precursor Chemical**
None of the ingredients are listed or exempt.

**SARA (311/312) Hazard Categories**
None of the ingredients are listed or exempt.

**OSHA Highly Hazardous Chemicals**
None of the ingredients are listed or exempt.

#### US State Regulations
Molybdenum Sulfide (pieces)

California Proposition 65 Carcinogens and Reproductive Toxins
None of the ingredients are listed or exempt.

California Air Toxics "Hot Spots" (A-I)
None of the ingredients are listed or exempt.

California Air Toxics "Hot Spots" (A-II)
None of the ingredients are listed or exempt.

California Directors List of Hazardous Substances
None of the ingredients are listed or exempt.

Massachusetts "Right To Know" List
Present.

Rhode Island "Right To Know" List
None of the ingredients are listed or exempt.

Minnesota "Right To Know" List
None of the ingredients are listed or exempt.

New Jersey "Right To Know" List
None of the ingredients are listed or exempt.

Pennsylvania "Right To Know" List
None of the ingredients are listed or exempt.

Inventories
Canada - DSL/NDSL
DSL

US - TSCA
None of the ingredients are listed or exempt.

US - TSCA 12(b) Export Notification
None of the ingredients are listed or exempt.

Philippines - PICCS
All the ingredients are listed or exempt.

New Zealand - NZIOC
All the ingredients are listed or exempt.

16. Other information
Revision date 6/3/2016
Revision 1
SDS No. 5059
End of SDS