



## SAFETY DATA SHEET

### Bismuth Zinc Niobium Oxide (pieces)

According to Appendix D, OSHA Hazard Communication Standard 29 CFR §1910.1200

#### 1. Identification

##### Product identifier

**Product name** Bismuth Zinc Niobium Oxide (pieces)

##### 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  
South Korea: (+82) 070 4732 5813  
Philippines: (+63) 2 83953471

Access Code - 333594

#### 2. Hazard(s) identification

##### Classification of the substance or mixture

**Physical hazards** Not Classified

**Health hazards** Not Classified

**Environmental hazards** Aquatic Acute 1 - H400 Aquatic Chronic 1 - H410

##### Label elements

## Bismuth Zinc Niobium Oxide (pieces)

### Hazard symbols



### Signal word

Warning

### Hazard statements

H410 Very toxic to aquatic life with long lasting effects.

### Precautionary statements

P273 Avoid release to the environment.

P391 Collect spillage.

P501 Dispose of contents/ container in accordance with national regulations.

### Other hazards

This product does not contain any substances classified as PBT or vPvB.

### 3. Composition/information on ingredients

#### Mixtures

<b>Bismuth Oxide (pieces)</b> CAS number: 1304-76-3	<b>0 - 100%</b>
<b>Classification</b> Not Classified	
<b>Zinc Oxide (pieces)</b> CAS number: 1314-13-2 M factor (Acute) = 1                      M factor (Chronic) = 10	<b>0 - 100%</b>
<b>Classification</b> Aquatic Acute 1 - H400 Aquatic Chronic 1 - H410	
<b>Niobium Oxide (pieces)</b> CAS number: 1313-96-8	<b>0 - 100%</b>
<b>Classification</b> Not Classified	

The full text for all hazard statements is 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

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 symptoms are severe or persist.

#### Ingestion

Rinse mouth thoroughly with water. Get medical advice/attention if you feel unwell. Do not induce vomiting unless under the direction of medical personnel.

## Bismuth Zinc Niobium Oxide (pieces)

<b>Skin Contact</b>	Rinse with water.
<b>Eye contact</b>	Rinse with water. Get medical attention if any discomfort continues.
<b>Protection of first aiders</b>	First aid personnel should wear appropriate protective equipment during any rescue.

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

<b>General information</b>	The severity of the symptoms described will vary dependent on the concentration and the length of exposure.
<b>Inhalation</b>	No specific symptoms known.
<b>Ingestion</b>	No specific symptoms known.
<b>Skin contact</b>	Prolonged contact may cause dryness of the skin.
<b>Eye contact</b>	No specific symptoms known. May be slightly irritating to eyes.

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

<b>Notes for the doctor</b>	Treat symptomatically.
<b>Specific treatments</b>	No special treatment required.

## 5. Fire-fighting measures

### Extinguishing media

<b>Suitable extinguishing media</b>	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.
<b>Unsuitable extinguishing media</b>	Do not use water jet as an extinguisher, as this will spread the fire.

### Special hazards arising from the substance or mixture

<b>Specific hazards</b>	None known.
<b>Hazardous combustion products</b>	Thermal decomposition or combustion products may include the following substances: Harmful gases or vapors.

### Advice for firefighters

<b>Protective actions during firefighting</b>	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. Avoid discharge to the aquatic environment. Control run-off water by containing and keeping it out of sewers and watercourses. If risk of water pollution occurs, notify appropriate authorities.
<b>Special protective equipment for firefighters</b>	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

<b>Personal precautions</b>	Wear protective clothing as described in Section 8 of this safety data sheet. No action shall be taken without appropriate training or involving any personal risk.
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### Environmental precautions

<b>Environmental precautions</b>	Avoid discharge into drains or watercourses or onto the ground. Avoid discharge to the aquatic environment.
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### Methods and material for containment and cleaning up

## Bismuth Zinc Niobium Oxide (pieces)

<b>Methods for cleaning up</b>	Wear protective clothing as described in Section 8 of this safety data sheet. Clear up spills immediately and dispose of waste safely. 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. Dangerous for the environment. Do not empty into drains. For waste disposal, see Section 13.
<b>Reference to other sections</b>	For personal protection, see Section 8. See Section 11 for additional information on health hazards. See Section 12 for additional information on ecological hazards. For waste disposal, see Section 13.

### 7. Handling and storage

#### Precautions for safe handling

<b>Usage precautions</b>	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. Avoid discharge to the aquatic environment. Do not handle until all safety precautions have been read and understood. Do not handle broken packages without protective equipment. Do not reuse empty containers.
<b>Advice on general occupational hygiene</b>	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

<b>Storage precautions</b>	Keep only in the original container. Keep container tightly closed, in a cool, well ventilated place. Keep containers upright. Protect containers from damage.
<b>Storage class</b>	Miscellaneous hazardous material storage.
<b>Specific end uses(s)</b>	
<b>Specific end use(s)</b>	The identified uses for this product are detailed in Section 1.

### 8. Exposure controls/Personal protection

#### Control parameters

#### Occupational exposure limits

#### **Zinc Oxide (pieces)**

Long-term exposure limit (8-hour TWA): OSHA 15 mg/m<sup>3</sup> total dust  
 Long-term exposure limit (8-hour TWA): ACGIH 2 mg/m<sup>3</sup> respirable fraction  
 Short-term exposure limit (15-minute): ACGIH 10 mg/m<sup>3</sup> respirable fraction  
 Long-term exposure limit (8-hour TWA): OSHA 5 mg/m<sup>3</sup> fume  
 Long-term exposure limit (8-hour TWA): OSHA 5 mg/m<sup>3</sup> respirable fraction  
 OSHA = Occupational Safety and Health Administration.  
 ACGIH = American Conference of Governmental Industrial Hygienists.

#### Zinc Oxide (pieces) (CAS: 1314-13-2)

**Immediate danger to life and health** 500 mg/m<sup>3</sup>

#### Exposure controls

#### **Protective equipment**



## Bismuth Zinc Niobium Oxide (pieces)

<b>Appropriate engineering controls</b>	Provide adequate ventilation. Observe any occupational exposure limits for the product or ingredients.
<b>Eye/face protection</b>	Unless the assessment indicates a higher degree of protection is required, the following protection should be worn: Tight-fitting safety glasses.
<b>Hand protection</b>	No specific hand protection recommended. Avoid contact with skin.
<b>Other skin and body protection</b>	Wear appropriate clothing to prevent repeated or prolonged skin contact.
<b>Hygiene measures</b>	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.
<b>Respiratory protection</b>	Ensure all respiratory protective equipment is suitable for its intended use and is NIOSH approved. Check that the respirator fits tightly and the filter is changed regularly. Gas and combination filter cartridges should comply with OSHA 1910.134. Full face mask respirators with replaceable filter cartridges should comply with OSHA 1910.134. Half mask and quarter mask respirators with replaceable filter cartridges should comply with OSHA 1910.134.
<b>Environmental exposure controls</b>	Keep container tightly sealed when not in use. 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.

### 9. Physical and chemical properties

#### Information on basic physical and chemical properties

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

## Bismuth Zinc Niobium Oxide (pieces)

**Viscosity** Not applicable.

**Molecular weight** Not available.

### 10. Stability and reactivity

**Reactivity** There are no known reactivity hazards associated with this product.

**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 LD<sub>50</sub>)** Based on available data the classification criteria are not met.

#### Acute toxicity - dermal

**Notes (dermal LD<sub>50</sub>)** Based on available data the classification criteria are not met.

#### Acute toxicity - inhalation

**Notes (inhalation LC<sub>50</sub>)** 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

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

#### Respiratory sensitization

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

#### Skin sensitization

**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

**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.

## Bismuth Zinc Niobium Oxide (pieces)

**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

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

### Aspiration hazard

**Aspiration hazard** Not relevant. Solid.

### **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.

### **Skin Contact**

Prolonged contact may cause dryness of the skin.

### **Eye contact**

No specific symptoms known.

### **Route of exposure**

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**

Aquatic Acute 1 - H400 Very toxic to aquatic life. Aquatic Chronic 1 - H410 Very toxic to aquatic life with long lasting effects.

### Persistence and degradability

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

### Bioaccumulative potential

**Bio-Accumulative Potential** No data available on bioaccumulation.

### **Partition coefficient**

Not applicable.

### Mobility in soil

### **Mobility**

No data available.

### Other adverse effects

**Other adverse effects** None known.

## 13. Disposal considerations

### Waste treatment methods

### **General information**

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. When handling waste, the safety precautions applying to handling of the product should be considered. Care should be taken when handling emptied containers that have not been thoroughly cleaned or rinsed out. Empty containers or liners may retain some product residues and hence be potentially hazardous.

## Bismuth Zinc Niobium Oxide (pieces)

**Disposal methods** Dispose of surplus products and those that cannot be recycled via a licensed waste disposal contractor. Waste, residues, empty containers, discarded work clothes and contaminated cleaning materials should be collected in designated containers, labeled with their contents. Incineration or landfill should only be considered when recycling is not feasible.

### 14. Transport information

**General** The product is not covered by international regulations on the transport of dangerous goods (IMDG, IATA, DOT).

#### UN Number

**UN No. (International)** Not applicable.

**UN No. (DOT)** Not applicable.

#### UN proper shipping name

**Proper shipping name (International)** Not applicable.

**Proper shipping name (DOT)** Not applicable.

#### Transport hazard class(es)

**Transport Labels (International)** No transport warning sign required.

#### DOT transport labels

No transport warning sign required.

#### Packing group

**Packing group (International)** Not applicable.

**DOT packing group** Not applicable.

#### Environmental hazards

##### **Environmentally Hazardous Substance**

No.

#### Special precautions for user

Based on available knowledge of this material, it has been determined to be non-hazardous and will not pose a risk to persons or the environment in its provided form. However, any cutting, welding, melting, grinding, or use for deposition will produce dust, fume, or particulates containing component elements of this material. Exposure to these components may present significant health hazards. Note: Fine particulate may be a combustible dust which, when dispersed in air, may present an explosion hazard.

**DOT reportable quantity** Not applicable.

**DOT TIH Zone** Not applicable.

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

### 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.



## Bismuth Zinc Niobium Oxide (pieces)

### **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**

#### **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**

None of the ingredients are listed or exempt.

#### **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**

#### **US - TSCA**

None of the ingredients are listed or exempt.

## Bismuth Zinc Niobium Oxide (pieces)

### 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

<b>Training advice</b>	Only trained personnel should use this material.
<b>Revision date</b>	1/10/2020
<b>Revision</b>	2
<b>Supersedes date</b>	1/10/2020
<b>SDS No.</b>	5690
<b>Hazard statements in full</b>	H400 Very toxic to aquatic life. H410 Very toxic to aquatic life with long lasting effects.

End of SDS

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty, guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such information for his own particular use.