SAFETY DATA SHEET
Lanthanum Nickel Oxide (pieces)

1. Identification

Product Identifier
Product name Lanthanum Nickel Oxide (pieces)
Internal identification Replaces M-3000-122

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 Skin Sens. 1 - H317 Carc. 1A - H350 STOT RE 1 - H372
Environmental hazards Aquatic Chronic 4 - H413

Label elements
Pictogram

Signal word Danger
Lanthanum Nickel Oxide (pieces)

Hazard statements

H317 May cause an allergic skin reaction.
H350 May cause cancer.
H372 Causes damage to organs through prolonged or repeated exposure.
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statements

P261 Avoid breathing vapor/spray.
P302+P352 If on skin: Wash with plenty of water.
P308+P313 If exposed or concerned: Get medical advice/attention.
P314 Get medical advice/attention if you feel unwell.
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P362+P364 Take off contaminated clothing and wash it before reuse.

Contains

Nickel Oxide

Other hazards

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

3. Composition/information on ingredients

Mixtures

<table>
<thead>
<tr>
<th>Lanthanum Oxide (pieces)</th>
<th>0 - 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS number: 1312-81-8</td>
<td></td>
</tr>
</tbody>
</table>

Classification

Not Classified

<table>
<thead>
<tr>
<th>Nickel Oxide</th>
<th>0 - 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS number: 1313-99-1</td>
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</tbody>
</table>

Classification

Skin Sens. 1 - H317
Carc. 1A - H350
STOT RE 1 - H372
Aquatic Chronic 4 - H413

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

Get medical attention if any discomfort continues. 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.

Skin Contact

It is important to remove the substance from the skin immediately. In the event of any sensitization symptoms developing, ensure further exposure is avoided. Remove contamination with soap and water or recognized skin cleansing agent. Get medical attention if symptoms are severe or persist after washing.

Eye contact

Rinse with water. Get medical attention if any discomfort continues.

Protection of first aiders

First aid personnel should wear appropriate protective equipment during any rescue.
Lanthanum Nickel Oxide (pieces)

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
Prolonged or repeated exposure may cause the following adverse effects: May cause cancer.

Ingestion
May cause sensitization or allergic reactions in sensitive individuals. Prolonged or repeated exposure may cause the following adverse effects: May cause cancer.

Skin contact
May cause skin sensitization or allergic reactions in sensitive individuals. Prolonged contact may cause dryness of the skin. Prolonged or repeated exposure may cause the following adverse effects: May cause cancer.

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. May cause sensitization or allergic reactions in sensitive individuals.

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.

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. Keep upwind to avoid inhalation of gases, vapors, fumes and smoke. Ventilate closed spaces before entering them. 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.

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
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. Avoid contact with skin and eyes.

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

Methods and material for containment and cleaning up
Lanthanum Nickel Oxide (pieces)

Methods for cleaning up
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.

Reference to other sections
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

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. May cause cancer. 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.

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
Keep only in the original container. Keep container tightly closed, in a cool, well ventilated place. Keep containers upright. Protect containers from damage.

Storage class
Miscellaneous hazardous material storage.

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

8. Exposure Controls/personal protection

Control parameters

Occupational exposure limits
Nickel Oxide
Long-term exposure limit (8-hour TWA): ACGIH 0.2 mg/m³ as Ni
A1
ACGIH = American Conference of Governmental Industrial Hygienists.
A1 = Confirmed Human Carcinogen.

Exposure controls

Protective equipment

Appropriate engineering controls
Provide adequate general and local exhaust ventilation. Ensure the ventilation system is regularly maintained and tested. Good general ventilation should be adequate to control worker exposure to airborne contaminants. Observe any occupational exposure limits for the product or ingredients.

Eye/face protection
Unless the assessment indicates a higher degree of protection is required, the following protection should be worn: Tight-fitting safety glasses.
Hand protection
Wear protective gloves. The most suitable glove should be chosen in consultation with the
glove supplier/manufacturer, who can provide information about the breakthrough time of the
glove material. To protect hands from chemicals, gloves should comply with OSHA 1910.138
and be demonstrated to be impervious to the chemical and resist degradation. Considering
the data specified by the glove manufacturer, check during use that the gloves are retaining
their protective properties and change them as soon as any deterioration is detected.
Frequent changes are recommended.

Other skin and body protection
Wear appropriate clothing to prevent any possibility of skin contact.

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
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.

Environmental exposure controls
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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</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>
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</tr>
<tr>
<td>Upper/lower flammability or</td>
<td>Not applicable</td>
</tr>
<tr>
<td>explosive limits</td>
<td></td>
</tr>
<tr>
<td>Vapor pressure</td>
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</tr>
<tr>
<td>Vapor density</td>
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</tr>
<tr>
<td>Relative density</td>
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</tr>
<tr>
<td>Bulk density</td>
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<td>Solubility(ies)</td>
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<td>Partition coefficient</td>
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<tr>
<td>Auto-ignition temperature</td>
<td>Not applicable</td>
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<tr>
<td>Decomposition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
Lanthanum Nickel Oxide (pieces)

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

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
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
May cause skin sensitization or allergic reactions in sensitive individuals.

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

Carcinogenicity
Carcinogenicity
May cause cancer.

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
Lanthanum Nickel Oxide (pieces)

STOT - repeated exposure  STOT RE 1 - H372 Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard  Not relevant. Solid.

General information  May cause cancer after repeated exposure. Risk of cancer depends on duration and level of exposure. The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

Inhalation  No specific symptoms known.

Ingestion  May cause sensitization or allergic reactions in sensitive individuals.

Skin Contact  May cause skin sensitization or allergic reactions in sensitive individuals. Prolonged contact may cause dryness of the skin.

Eye contact  No specific symptoms known.

Route of entry  Ingestion Inhalation Skin and/or eye contact

Target Organs  No specific target organs known.

Medical considerations  Skin disorders and allergies.

12. Ecological Information

Toxicity  Aquatic Chronic 4 - H413 May cause long lasting harmful effects to aquatic life.

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

Bioaccumulative Potential  No data available on bioaccumulation.

Mobility in soil  No data available.

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. 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.

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).

7/9
Lanthanum Nickel Oxide (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**

**California Proposition 65 Carcinogens and Reproductive Toxins**
None of the ingredients are listed or exempt.
Lanthanum Nickel Oxide (pieces)

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.

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

Training advice
Only trained personnel should use this material.

SDS No.
4908

Hazard statements in full
H317 May cause an allergic skin reaction.
H350 May cause cancer.
H372 Causes damage to organs through prolonged or repeated exposure.
H372 Causes damage to organs (Lungs) through prolonged or repeated exposure.
H413 May cause long lasting harmful effects to aquatic life.

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.