Section 1. Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product Code: 16117
1.2 Relevant identified uses of the substance or mixture and uses advised against:
   Relevant identified uses: For research use only, not for human or veterinary use.

Section 2. Hazards Identification

2.1 Classification of the Substance or Mixture:
2.1.1 Classification according to Regulation (EC) No 1272/2008 [CLP]:
Based on evaluation of currently available data this substance or mixture is not classifiable according to GHS.

2.2 Label Elements:
2.2.1 Labeling according to Regulation (EC) No 1272/2008 [CLP]:
GHS Signal Word:
GHS Hazard Phrases:
Based on evaluation of currently available data this substance or mixture is not classifiable according to GHS.
GHS Precaution Phrases:
No phrases apply.
GHS Response Phrases:
No phrases apply.
GHS Storage and Disposal Phrases:
Please refer to Section 7 for Storage and Section 13 for Disposal information.

2.3 Adverse Human Health Effects and Symptoms:
Material may be irritating to the mucous membranes and upper respiratory tract.
May be harmful by inhalation, ingestion, or skin absorption.
May cause eye, skin, or respiratory system irritation.
To the best of our knowledge, the toxicological properties have not been thoroughly investigated.

Section 3. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>CAS # / RTECS #</th>
<th>Hazardous Components (Chemical Name)/REACH Registration No.</th>
<th>Concentration</th>
<th>EC No./EC Index No.</th>
<th>GHS Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>36090-88-3 NA</td>
<td>Ruthenium(2+), tris(4,7-diphenyl-1,10-phenanthroline-kappa.N1, kappa.N10)-, chloride (1:2), (OC-6-11)-</td>
<td>100.0 %</td>
<td>609-229-6 NA</td>
<td>No data available</td>
</tr>
</tbody>
</table>
SAFETY DATA SHEET
Tris(4,7-diphenyl-1,10-phenanthroline)ruthenium II
dichloride complex

Section 4. First Aid Measures

4.1 Description of First Aid Measures:

In Case of Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Get immediate medical attention.

In Case of Skin Contact: Immediately wash skin with soap and plenty of water for at least 15 minutes. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

In Case of Eye Contact: Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. Have eyes examined and tested by medical personnel.

In Case of Ingestion: Wash out mouth with water provided person is conscious. Never give anything by mouth to an unconscious person. Get medical attention. Do NOT induce vomiting unless directed to do so by medical personnel.

Section 5. Fire Fighting Measures

5.1 Suitable Extinguishing Media:
Use alcohol-resistant foam, carbon dioxide, water, or dry chemical spray.

Use water spray to cool fire-exposed containers.

Unsuitable Extinguishing Media:
A solid water stream may be inefficient.

5.2 Flammable Properties and Hazards:
No data available.

Flash Pt: No data.

Explosive Limits:
LEL: No data. UEL: No data.

Autoignition Pt: No data.

5.3 Fire Fighting Instructions:
As in any fire, wear self-contained breathing apparatus pressure-demand (NIOSH approved or equivalent), and full protective gear to prevent contact with skin and eyes.

Section 6. Accidental Release Measures

6.1 Protective Precautions, Protective Equipment and Emergency Procedures:

Avoid raising and breathing dust, and provide adequate ventilation.

As conditions warrant, wear a NIOSH approved self-contained breathing apparatus, or respirator, and appropriate personal protection (rubber boots, safety goggles, and heavy rubber gloves).

6.2 Environmental Precautions:
Take steps to avoid release into the environment, if safe to do so.

6.3 Methods and Material For Containment and Cleaning:

Contain spill and collect, as appropriate.

Transfer to a chemical waste container for disposal in accordance with local regulations.

Section 7. Handling and Storage

7.1 Precautions To Be Taken in Handling:
Avoid breathing dust/fume/gas/mist/vapours/spray.

Avoid prolonged or repeated exposure.

7.2 Precautions To Be Taken in Storing:
Keep container tightly closed.

Store in accordance with information listed on the product insert.

Section 8. Exposure Controls/Personal Protection

8.1 Exposure Parameters:

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Partial Chemical Name</th>
<th>Britain EH40</th>
<th>France VL</th>
<th>Europe</th>
</tr>
</thead>
</table>
### Section 9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>9.1 Information on Basic Physical and Chemical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical States:</strong></td>
</tr>
<tr>
<td><strong>Appearance and Odor:</strong></td>
</tr>
<tr>
<td><strong>Melting Point:</strong></td>
</tr>
<tr>
<td><strong>Boiling Point:</strong></td>
</tr>
<tr>
<td><strong>Flash Pt:</strong></td>
</tr>
<tr>
<td><strong>Evaporation Rate:</strong></td>
</tr>
<tr>
<td><strong>Explosive Limits:</strong></td>
</tr>
<tr>
<td><strong>Vapor Pressure (vs. Air or mm Hg):</strong></td>
</tr>
<tr>
<td><strong>Vapor Density (vs. Air = 1):</strong></td>
</tr>
<tr>
<td><strong>Specific Gravity (Water = 1):</strong></td>
</tr>
<tr>
<td><strong>Solubility in Water:</strong></td>
</tr>
<tr>
<td><strong>Solubility Notes:</strong></td>
</tr>
<tr>
<td><strong>Autoignition Pt:</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9.2 Other Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percent Volatile:</strong></td>
</tr>
<tr>
<td><strong>Molecular Formula &amp; Weight:</strong></td>
</tr>
</tbody>
</table>
SAFETY DATA SHEET
Tris(4,7-diphenyl-1,10-phenanthroline)ruthenium II
dichloride complex

Section 10. Stability and Reactivity

10.1 Reactivity: No data available.
10.2 Stability: Unstable [ ] Stable [ X ]
10.3 Stability Note(s): Stable if stored in accordance with information listed on the product insert.
10.4 Conditions To Avoid: No data available.
10.5 Incompatibility - Materials No data available.
    To Avoid:
10.6 Hazardous Decomposition Or
    carbon dioxide
    carbon monoxide
    Byproducts:
    hydrogen chloride gas
    nitrogen oxides
    ruthenium oxide

Section 11. Toxicological Information

11.1 Information on The toxicological effects of this product have not been thoroughly studied.
    Toxicological Effects:

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Hazardous Components (Chemical Name)</th>
<th>NTP</th>
<th>IARC</th>
<th>ACGIH</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>36309-88-3</td>
<td>Ruthenium(2+), tris(4,7-diphenyl-1,10-phenanthroline-.kappa.N1,.kappa.N10 ), chloride (1:2), (OC-6-11)-</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

Section 12. Ecological Information

12.1 Toxicity: Avoid release into the environment.
    Runoff from fire control or dilution water may cause pollution.
12.2 Persistence and Degradability: No data available.
12.3 Bioaccumulative Potential: No data available.
12.4 Mobility in Soil: No data available.
12.5 Results of PBT and vPvB assessment: No data available.

Section 13. Disposal Considerations

13.1 Waste Disposal Method: Dispose in accordance with local, state, and federal regulations.

Section 14. Transport Information

14.1 LAND TRANSPORT (US DOT):
    DOT Proper Shipping Name: Not dangerous goods.
    DOT Hazard Class:
    UN/NA Number:
14.1 LAND TRANSPORT (European ADR/RID):
    ADR/RID Shipping Name: Not dangerous goods.
    UN Number:
    Hazard Class:
SAFETY DATA SHEET
Tris(4,7-diphenyl-1,10-phenanthroline)ruthenium II dichloride complex

14.3 AIR TRANSPORT (ICAO/IATA):
ICAO/IATA Shipping Name: Not dangerous goods.
Additional Transport Information: Transport in accordance with local, state, and federal regulations.

Section 15. Regulatory Information

EPA SARA (Superfund Amendments and Reauthorization Act of 1986) Lists

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Hazardous Components (Chemical Name)</th>
<th>S. 302 (EHS)</th>
<th>S. 304 RQ</th>
<th>S. 313 (TRI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36309-88-3</td>
<td>Ruthenium(2+), tris(4,7-diphenyl-1,10-phenanthroline-.kappa.N1, kappa.N10)-, chloride (1:2), (OC-6-11)-</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Other US EPA or State Lists

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Hazardous Components (Chemical Name)</th>
<th>Other US EPA or State Lists</th>
</tr>
</thead>
<tbody>
<tr>
<td>36309-88-3</td>
<td>Ruthenium(2+), tris(4,7-diphenyl-1,10-phenanthroline-.kappa.N1, kappa.N10)-, chloride (1:2), (OC-6-11)-</td>
<td>CAA HAP, ODC: No; CWA NPDES: No; TSCA: No; CA PROP.65: No</td>
</tr>
</tbody>
</table>

Regulatory Information Statement: This SDS was prepared in accordance with 29 CFR 1910.1200 and Regulation (EC) No.1272/2008.

Section 16. Other Information

Revision Date: 02/06/2015
Additional Information About This Product: No data available.
Company Policy or Disclaimer: DISCLAIMER: This information is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.