SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier
Product name : Rh-42 Carbonylhydridotris(triphenylphosphine)Rh(I)
EC number : 241-230-3
CAS number : 17185-29-4
Product code : 209042
Product description : Not available.
Product type : Powder.
Other means of identification : Rhodium, carbonylhydrotris(triphenylphosphine)-, (TB-5-23)-; Rhodium, carbonylhydrotris(triphenylphosphine)-, (betaB-5-23)-
Chemical formula : C55H46OP3Rh

1.2 Relevant identified uses of the substance or mixture and uses advised against
Not applicable.

1.3 Details of the supplier of the safety data sheet
Johnson Matthey Plc,
Orchard Road,
Royston,
Herts SG8 5HE
e-mail address of person responsible for this SDS : EHS_CCR@matthey.com

1.4 Emergency telephone number
Supplier
Telephone number : +44(0)1763253000
Hours of operation : 24 hours

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
Product definition : Mono-constituent substance
Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]
Aquatic Chronic 4, H413
The product is classified as hazardous according to Regulation (EC) 1272/2008 as amended.
Classification according to Directive 67/548/EEC [DSD]
R53
See Section 16 for the full text of the R phrases or H statements declared above.
See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements
Signal word : No signal word.
Hazard statements : May cause long lasting harmful effects to aquatic life.

Date of issue/Date of revision : 26/11/2014.
SECTION 2: Hazards identification

Precautionary statements

Prevention
Avoid release to the environment.

Response
Not applicable.

Storage
Not applicable.

Disposal
Not applicable.

Hazardous ingredients
carbonylhydrotris(triphenylphosphine)rhodium

Supplemental label elements
Not applicable.

Annex XVII - Restrictions
Not applicable.

Special packaging requirements
Containers to be fitted with child-resistant fastenings
Not applicable.

Tactile warning of danger
Not applicable.

2.3 Other hazards

Substance meets the criteria for PBT according to Regulation (EC) No. 1907/2006, Annex XIII:
P: Not available.  B: Not available.  T: No.

Substance meets the criteria for vPvB according to Regulation (EC) No. 1907/2006, Annex XIII:
Not available.

Other hazards which do not result in classification
Fine dust clouds may form explosive mixtures with air. Handling and/or processing of this material may generate a dust which can cause mechanical irritation of the eyes, skin, nose and throat.

SECTION 3: Composition/information on ingredients

3.1 Substances
Mono-constituent substance

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Identifiers</th>
<th>%</th>
<th>Classification</th>
<th>Regulation (EC) No. 1272/2008 [CLP]</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbonylhydrotris(triphenylphosphine) rhodium</td>
<td>EC: 241-230-3 CAS: 17185-29-4</td>
<td>99 - 100</td>
<td>R53</td>
<td>Aquatic Chronic 4, H413</td>
<td>[A]</td>
</tr>
</tbody>
</table>

See Section 16 for the full text of the R-phrases declared above.

See Section 16 for the full text of the H statements declared above.

There are no additional ingredients present which, within the current knowledge of the supplier, are classified and contribute to the classification of the substance and hence require reporting in this section.

Type
[A] Constituent
[B] Impurity
[C] Stabilising additive

Occupational exposure limits, if available, are listed in Section 8.

Date of issue/Date of revision : 26/11/2014.
SECTION 4: First aid measures

4.1 Description of first aid measures

**Eye contact**: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

**Inhalation**: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

**Skin contact**: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Clean shoes thoroughly before reuse.

**Ingestion**: Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

**Protection of first-aiders**: No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

4.2 Most important symptoms and effects, both acute and delayed

**Potential acute health effects**

**Eye contact**: Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

**Inhalation**: Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

**Skin contact**: No known significant effects or critical hazards.

**Ingestion**: No known significant effects or critical hazards.

**Over-exposure signs/symptoms**

**Eye contact**: Adverse symptoms may include the following: irritation, redness.

**Inhalation**: Adverse symptoms may include the following: respiratory tract irritation, coughing.

**Skin contact**: No specific data.

**Ingestion**: No specific data.

4.3 Indication of any immediate medical attention and special treatment needed

**Notes to physician**: No specific treatment.
SECTION 5: Firefighting measures

5.1 Extinguishing media
Suitable extinguishing media : Use dry chemical powder.
Unsuitable extinguishing media : Do not use water jet.

5.2 Special hazards arising from the substance or mixture
Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
phosphorus oxides
metal oxide/oxides

5.3 Advice for firefighters
Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

Remark : The residue, ash or char left after a fire may have catalytic properties and may promote the re-ignition of flammable materials and vapours.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spill material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

6.2 Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

6.3 Methods and materials for containment and cleaning up
Small spill : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labelled waste container. Avoid creating dusty conditions and prevent wind dispersal. Dispose of via a licensed waste disposal contractor.
SECTION 6: Accidental release measures

6.4 Reference to other sections:
- See Section 1 for emergency contact information.
- See Section 8 for information on appropriate personal protective equipment.
- See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

7.1 Precautions for safe handling

Protective measures:
- Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing dust. Avoid release to the environment. Avoid the creation of dust when handling and avoid all possible sources of ignition (spark or flame). Prevent dust accumulation. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Electrical equipment and lighting should be protected to appropriate standards to prevent dust coming into contact with hot surfaces, sparks or other ignition sources. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene:
  - Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

7.3 Specific end use(s)

Recommendations:
- Not available.

Industrial sector specific solutions:
- Not available.

SECTION 8: Exposure controls/personal protection

The information in this section contains generic advice and guidance. Information is provided based on typical anticipated uses of the product. Additional measures might be required for bulk handling or other uses that could significantly increase worker or exposure or environmental releases.

8.1 Control parameters

Occupational exposure limits

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Exposure limit values</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbonylhydrotris(triphenylphosphine)rhodium</td>
<td>EH40/2005 WELs (United Kingdom (UK), 12/2011). TWA: 0.001 mg/m³, (as Rh) 8 hours. Form: Soluble Salt. STEL (15 mins): 0.003 mg/m³, (as Rh) 15 minutes. Form: Soluble Salt.</td>
</tr>
</tbody>
</table>

Date of issue/Date of revision: 26/11/2014.
SECTION 8: Exposure controls/personal protection

Recommended monitoring procedures: If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

DNELs/DMELs
No DNELs/DMELs available.

PNECs
No PNECs available

8.2 Exposure controls

Appropriate engineering controls: Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Individual protection measures

Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields. If operating conditions cause high dust concentrations to be produced, use dust goggles.

Skin protection

Hand protection: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection: Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection: Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Date of issue/Date of revision: 26/11/2014.
**SECTION 8: Exposure controls/personal protection**

**Environmental exposure controls**

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.

**SECTION 9: Physical and chemical properties**

9.1 Information on basic physical and chemical properties

**Appearance**

- **Physical state**: Solid. [Crystalline powder.]
- **Colour**: Yellow.
- **Odour**: Not available.
- **Odour threshold**: Not available.
- **pH**: Not available.
- **Melting point/freezing point**: 120 to 122°C
- **Initial boiling point and boiling range**: Decomposition temperature: 115°C

- **Flash point**: Not available.
- **Evaporation rate**: Not available.
- **Flammability (solid, gas)**: Not available.
- **Upper/lower flammability or explosive limits**: Not available.
- **Vapour pressure**: Not available.
- **Vapour density**: Not available.
- **Relative density**: Not available.
- **Solubility(ies)**: Insoluble in the following materials: cold water.

- **Partition coefficient: n-octanol/water**: Not available.
- **Auto-ignition temperature**: Not available.
- **Decomposition temperature**: 115°C
- **Viscosity**: Not available.
- **Explosive properties**: Not available.
- **Oxidising properties**: Not available.

9.2 Other information

No additional information.

**SECTION 10: Stability and reactivity**

10.1 Reactivity

No specific test data related to reactivity available for this product or its ingredients.

10.2 Chemical stability

The catalytic properties of this material may give it a low ignition temperature (except when supplied as a paste). The catalytic properties will also promote the oxidation and possible ignition of flammable liquids and vapours. A used, filtered catalyst should, therefore, be kept wet and out of contact with combustible vapours and liquids. The material is supplied in a stable condition and other than the previously mentioned catalytic hazards of this material, no specific reactive hazards are known.

10.3 Possibility of hazardous reactions

Under normal conditions of storage and use, hazardous reactions will not occur.

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Date of issue/Date of revision: 26/11/2014.
SECTION 10: Stability and reactivity

10.4 Conditions to avoid : Avoid the creation of dust when handling and avoid all possible sources of ignition (spark or flame). Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Prevent dust accumulation.

10.5 Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials

10.6 Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Conclusion/Summary : Not available.

Irritation/Corrosion Conclusion/Summary : Not available.

Sensitisation Conclusion/Summary : Not available.

Mutagenicity Conclusion/Summary : Not available.

Carcinogenicity Conclusion/Summary : Not available.

Reproductive toxicity Conclusion/Summary : Not available.

Teratogenicity Conclusion/Summary : Not available.

Specific target organ toxicity (single exposure) Not available.

Specific target organ toxicity (repeated exposure) Not available.

Aspiration hazard Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

Inhalation : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following: irritation redness.

Date of issue/Date of revision : 26/11/2014.
SECTION 11: Toxicological information

Inhalation: Adverse symptoms may include the following:
- respiratory tract irritation
- coughing

Skin contact: No specific data.

Ingestion: No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure
- Potential immediate effects: Not available.
- Potential delayed effects: Not available.

Long term exposure
- Potential immediate effects: Not available.
- Potential delayed effects: Not available.

Potential chronic health effects
Not available.

Conclusion/Summary: Not available.

General: Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.

Carcinogenicity: No known significant effects or critical hazards.

Mutagenicity: No known significant effects or critical hazards.

Teratogenicity: No known significant effects or critical hazards.

Developmental effects: No known significant effects or critical hazards.

Fertility effects: No known significant effects or critical hazards.

Other information: Not available.

Other adverse symptoms: No known significant effects or critical hazards.

SECTION 12: Ecological information

12.1 Toxicity
Conclusion/Summary: May cause long-term adverse effects in the aquatic environment.

12.2 Persistence and degradability
Conclusion/Summary: Not available.

12.3 Bioaccumulative potential
Not available.

12.4 Mobility in soil
Soil/water partition coefficient (K<sub>OC</sub>): Not available.

Mobility: Not available.

12.5 Results of PBT and vPvB assessment
PBT: No.
- P: Not available. B: Not available. T: No.

vPvB: Not available.
- vP: Not available. vB: Not available.

12.6 Other adverse effects: No known significant effects or critical hazards.

Date of issue/Date of revision: 26/11/2014.
SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

**Product**

**Methods of disposal**: The generation of waste should be avoided or minimised wherever possible. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Empty containers or liners may retain some product residues. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Return accumulated waste material to the refinery for metal recovery, or dispose of in accordance with local and national regulations.

**Hazardous waste**

**Packaging**

**Methods of disposal**: The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

**Special precautions**: This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14: Transport information

<table>
<thead>
<tr>
<th>14.1 UN number</th>
<th>ADR/RID</th>
<th>ADN</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
</table>

| 14.2 UN proper shipping name | - | - | - | - |
| 14.3 Transport hazard class(es) | - | - | - | - |
| 14.4 Packing group | - | - | - | - |
| 14.5 Environmental hazards | No. | No. | No. | No. |

**Additional information**: -

**14.6 Special precautions for user**: Transport within user’s premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

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

Date of issue/Date of revision: 26/11/2014.
15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

**EU Regulation (EC) No. 1907/2006 (REACH)**

**Annex XIV - List of substances subject to authorisation**

None of the components are listed.

**Substances of very high concern**

None of the components are listed.

**Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles**

Not applicable.

**Other EU regulations**

**Europe inventory**

This material is listed or exempted.

**Seveso II Directive**

This product is not controlled under the Seveso II Directive.

**International regulations**

**Chemical Weapon Convention List Schedules I, II & III Chemicals**

Not listed.

**Montreal Protocol (Annexes A, B, C, E)**

Not listed.

**Stockholm Convention on Persistent Organic Pollutants**

Not listed.

**Rotterdam Convention on Prior Inform Consent (PIC)**

Not listed.

**UNECE Aarhus Protocol on POPs and Heavy Metals**

Not listed.

**International lists**

**National inventory**

**Australia**

This material is listed or exempted.

**Canada**

This material is not listed in DSL but is listed in NDSL.

**China**

Not determined.

**Japan**

Not determined.

**Malaysia**

Not determined.

**New Zealand**

This material is listed or exempted.

**Philippines**

This material is listed or exempted.

**Republic of Korea**

Not determined.

**Taiwan**

Not determined.

**United States**

United States inventory (TSCA 8b): This material is listed or exempted.

15.2 Chemical Safety Assessment

Not available.
SECTION 16: Other information

Indicates information that has changed from previously issued version.

Abbreviations and acronyms:
- ATE = Acute Toxicity Estimate
- CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
- DMEL = Derived Minimal Effect Level
- DNEL = Derived No Effect Level
- EUH statement = CLP-specific Hazard statement
- PBT = Persistent, Bioaccumulative and Toxic
- PNEC = Predicted No Effect Concentration
- RRN = REACH Registration Number
- vPvB = Very Persistent and Very Bioaccumulative

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

<table>
<thead>
<tr>
<th>Classification</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Chronic 4, H413</td>
<td>Expert judgment</td>
</tr>
</tbody>
</table>

Full text of abbreviated H statements: H413, May cause long lasting harmful effects to aquatic life.

Full text of classifications [CLP/GHS]: Aquatic Chronic 4, H413, LONG-TERM AQUATIC HAZARD - Category 4

Full text of abbreviated R phrases: R53-, May cause long-term adverse effects in the aquatic environment.

Full text of classifications [DSD/DPD]: Not applicable.

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Date of issue/review: 26/11/2014.
Date of previous issue: 26/11/2014.
Version: 0.02

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Date of issue/review: 26/11/2014.