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

1.1 Product identifier
- Product name: Ruthenium Standard: 10000 µg/mL Ru in 20% HCl [100ml bottle]
- Part number: 5190-8442
- Relevant identified uses of the substance or mixture and uses advised against
  No further relevant information available.
- Application of the substance / the mixture
  Reference material for laboratory use only
- Manufacturer/Supplier:
  Agilent Technologies Manufacturing GmbH & Co. KG
  Hewlett-Packard-Str. 8
  76337 Waldbronn
  Germany
- Further information obtainable from: e-mail: pdl-msds_author@agilent.com
- Emergency telephone number: CHEMTREC®: +(44)-870-8200418

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
- Classification according to Regulation (EC) No 1272/2008
  GHS05 corrosion
  Met. Corr.1 H290 May be corrosive to metals.
- Classification according to Directive 67/548/EEC or Directive 1999/45/EC Not applicable.
- Information concerning particular hazards for human and environment:
  The product has to be labelled due to the calculation procedure of the “General Classification guideline for preparations of the EU” in the latest valid version.
- Classification system:
  The classification is according to the latest editions of the EU-lists, and extended by company and literature data.
- 2.2 Label elements
- Labelling according to Regulation (EC) No 1272/2008
  The product is classified and labelled according to the CLP regulation.
- Hazard pictograms
  GHS05

- Signal word Warning
- Hazard statements
  H290 May be corrosive to metals.
- Precautionary statements
  P234 Keep only in original container.
  P390 Absorb spillage to prevent material damage.
  P406 Store in corrosive resistant container with a resistant inner liner.
- 2.3 Other hazards
- Results of PBT and vPvB assessment
  PBT: Not applicable.
  vPvB: Not applicable.

(Contd. on page 2)
SECTION 3: Composition/information on ingredients

- 3.2 Chemical characterisation: Mixtures
  - Description:
    Aqueous solution.
    Also contains substances at levels not considered to be hazardous.
  - Dangerous components:
    - CAS: 7647-01-0
      - EINECS: 231-595-7
      - Hydrochloric acid
      - RTECS: MW 9620000
      - Xi R37
      - Skin Corr. 1B, H314;
      - STOT SE 3, H335
    < 10%
  - Additional information: For the wording of the listed risk phrases refer to section 16.

SECTION 4: First aid measures

- 4.1 Description of first aid measures
  - After inhalation: Supply fresh air; consult doctor in case of complaints.
  - After skin contact: Immediately wash with water and soap and rinse thoroughly.
  - After eye contact: Rinse opened eye for several minutes under running water.
  - After swallowing: Rinse mouth. Do not induce vomiting.
- 4.2 Most important symptoms and effects, both acute and delayed
  No further relevant information available.
- 4.3 Indication of any immediate medical attention and special treatment needed
  No further relevant information available.

SECTION 5: Firefighting measures

- 5.1 Extinguishing media
  - Suitable extinguishing agents:
    CO₂, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- 5.2 Special hazards arising from the substance or mixture
  Formation of toxic gases is possible during heating or in case of fire.
- 5.3 Advice for firefighters
  - Protective equipment: Wear self-contained respiratory protective device.

SECTION 6: Accidental release measures

- 6.1 Personal precautions, protective equipment and emergency procedures
  Wear protective clothing.
- 6.2 Environmental precautions:
  Dilute with plenty of water.
  Do not allow to enter sewers/surface or ground water.
- 6.3 Methods and material for containment and cleaning up:
  Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
- 6.4 Reference to other sections
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.

SECTION 7: Handling and storage

- 7.1 Precautions for safe handling
  Store in cool, dry place in tightly closed receptacles.
- Information about fire - and explosion protection:
  No special measures required.

(Contd. from page 1)
Product name: Ruthenium Standard: 10000 µg/mL Ru in 20% HCl [100ml bottle]

- 7.2 Conditions for safe storage, including any incompatibilities
- Storage:
  - Requirements to be met by storerooms and receptacles:
    Store in a cool location.
    Please refer to the manufacturer’s certificate for specific storage and transport temperature conditions.
    Store only in the original receptacle.
    Keep container in a well-ventilated place. Keep away from sources of ignition and heat.
  - Information about storage in one common storage facility: Store away from foodstuffs.
  - Further information about storage conditions: None.
- 7.3 Specific end use(s) No further relevant information available.

SECTION 8: Exposure controls/personal protection

- Additional information about design of technical facilities: No further data; see item 7.
- 8.1 Control parameters
  - Ingredients with limit values that require monitoring at the workplace:
    7647-01-0 hydrochloric acid
    WEL Short-term value: 8 mg/m³, 5 ppm
    Long-term value: 2 mg/m³, 1 ppm
    (gas and aerosol mists)
  - Additional information: Lists used were valid at the time of SDS preparation.
- 8.2 Exposure controls
  - Personal protective equipment:
    - General protective and hygienic measures: Wash hands before breaks and at the end of work.
    - Respiratory protection:
      In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.
    - Protection of hands:
      Chemical-resistant, impervious gloves with an approved standards should be worn at all times.
      The selection of the glove material is based on the penetration times, rates of diffusion and its degradation
      
      Protective gloves

- Material of gloves
  - PVC gloves
  - Neoprene gloves
- Penetration time of glove material
  The protection time of the gloves can not be accurately estimated for mixtures consisting of several substances.
  Refer to and observe manufacturers break through times of the protective gloves.
- Eye protection: Safety glasses

SECTION 9: Physical and chemical properties

- 9.1 Information on basic physical and chemical properties
- General Information
- Appearance:
  - Form: Liquid
  - Colour: Colourless

(Contd. from page 4)
Odour: Odourless
- Odour threshold: Not determined.

- pH-value at 20 °C: < 1.5

- Change in condition
  Melting point/Melting range: Not determined.
  Boiling point/Boiling range: 100 °C

- Flash point: Not applicable.
- Flammability (solid, gaseous): Not determined.
- Ignition temperature:
  Decomposition temperature: Not determined.
- Self-igniting: Product is not self-igniting.
- Danger of explosion: Not determined.
- Explosion limits:
  Lower: Not determined.
  Upper: Not determined.

- Vapour pressure at 20 °C: 23 hPa

- Density at 20 °C: 1.0111 g/cm³
- Relative density: Not determined.
- Vapour density: Not determined.
- Evaporation rate: Not determined.

- Solubility in / Miscibility with water: Fully miscible.
- Partition coefficient (n-octanol/water): Not determined.
- Viscosity:
  Dynamic: Not determined.
  Kinematic: Not determined.
- 9.2 Other information
  No further relevant information available.

SECTION 10: Stability and reactivity

- 10.1 Reactivity
  Stable under normal conditions.
- 10.2 Chemical stability
  Stable under normal conditions.
- Thermal decomposition / conditions to be avoided:
  Formation of toxic gases is possible during heating or in case of fire.
- 10.3 Possibility of hazardous reactions
  No dangerous reactions known.
- 10.4 Conditions to avoid
  Heat.
- 10.5 Incompatible materials:
  Strong oxidizing agents.
- 10.6 Hazardous decomposition products:
  Formation of toxic gases is possible during heating or in case of fire.

SECTION 11: Toxicological information

- 11.1 Information on toxicological effects
- Acute toxicity:
- Primary irritant effect:
  on the skin: No irritating effect.
Safety data sheet
according to 1907/2006/EC, Article 31

Product name: Ruthenium Standard: 10000 µg/mL Ru in 20% HCl [100ml bottle]

- on the eye: No irritating effect.
- Sensitisation: No sensitising effects known.

SECTION 12: Ecological information

- 12.1 Toxicity
- Aquatic toxicity: No further relevant information available.
- 12.2 Persistence and degradability No further relevant information available.
- 12.3 Bioaccumulative potential No further relevant information available.
- 12.4 Mobility in soil No further relevant information available.
- Additional ecological information:
  - General notes:
    Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
    Do not allow undiluted product to reach ground water, water course or sewage system.
- 12.5 Results of PBT and vPvB assessment
  - PBT: Not applicable.
  - vPvB: Not applicable.
- 12.6 Other adverse effects No further relevant information available.

SECTION 13: Disposal considerations

- 13.1 Waste treatment methods
  - Recommendation
    Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
  - European waste catalogue
    Waste disposal key numbers from EWC have to be assigned depending on origin and processing.
  - Uncleaned packaging:
    - Recommendation: Dispose of in accordance with national regulations.
    - Recommended cleansing agents: Water, if necessary together with cleansing agents.

SECTION 14: Transport information

- 14.1 UN-Number
  - ADR, IMDG, IATA UN1789
  - IMDG, IATA HYDROCHLORIC ACID solution
- 14.3 Transport hazard class(es)
  - ADR, IMDG, IATA
    - Class 8 Corrosive substances.
    - Label 8
- 14.4 Packing group
  - ADR, IMDG, IATA II
- 14.5 Environmental hazards:
  - Marine pollutant: No
- 14.6 Special precautions for user
  - Warning: Corrosive substances.
Product name: Ruthenium Standard: 10000 µg/mL Ru in 20% HCl [100ml bottle]

<table>
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<tr>
<th>Danger code (Kemler):</th>
<th>80</th>
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<td>F-A-S-B</td>
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<tr>
<td>Segregation groups</td>
<td>Acids</td>
</tr>
</tbody>
</table>

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code Not applicable.

Transport/Additional information:

- **ADR**
  - Limited quantities (LQ) 1L
  - Transport category 2
  - Tunnel restriction code E

UN "Model Regulation": UN1789, HYDROCHLORIC ACID solution, 8, II

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

- **Philippines Inventory of Chemicals and Chemical Substances**
  All ingredients are listed.

- **Australian Inventory of Chemical Substances**
  All ingredients are listed.

- **Standard for the Uniform Scheduling of Medicines and Poisons**
  7647-01-0 hydrochloric acid S5, S6

15.2 Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

The information contained in this document is based on Agilent’s state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

- **Relevant phrases**
  - H314 Causes severe skin burns and eye damage.
  - H335 May cause respiratory irritation.
  - R34 Causes burns.
  - R37 Irritating to respiratory system.

- **Abbreviations and acronyms:**
  - ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
  - IMDG: International Maritime Code for Dangerous Goods
  - IATA: International Air Transport Association
  - GHS: Globally Harmonised System of Classification and Labelling of Chemicals
  - EINECS: European Inventory of Existing Commercial Chemical Substances
  - ELINCS: European List of Notified Chemical Substances
  - CAS: Chemical Abstracts Service (division of the American Chemical Society)
  - Met. Corr. 1B: Corrosive to metals, Hazard Category 1B
  - Skin Corr. 1B: Skin corrosion/irritation, Hazard Category 1B
  - STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3

- **Sources**