1 Identification of substance

- Trade name: DEHA 2 Reagent Solution
- Product use: Reagent for water analysis
- Catalogue number: L531410
- Manufacturer/Supplier:
  Orbeco-Hellige, Inc.
  6456 Parkland Drive
  Sarasota, FL 34243
  USA
  phone: (941) 756-6410
  fax: (941) 727-9654
  www.orbeco.com
  Made in Germany
- Emergency information: Chemtrec: 800-424-9300

2 Hazards identification

- Hazard description:
  C Corrosive

- Canadian Hazard Symbols:

- WHMIS classification:
  E
  Corrosive material

- Information pertaining to particular dangers for man 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.
  R 34 Causes burns.

- Classification system:
  The classification was made according to the latest editions of international substances lists, and expanded upon from company and literature data.

- NFPA ratings (scale 0 - 4)
  Health = 3
  Fire = 0
  Reactivity = 0

- GHS label elements:
  Danger

  3.2/1A - Causes severe skin burns and eye damage.
Trade name: DEHA 2 Reagent Solution

Prevention:
Do not breathe dust/fume/gas/mist/vapours/spray.

Response:
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Immediately call a POISON CENTER or doctor/physician.

Storage:
Store locked up.

Disposal:
Dispose of contents/container in accordance with local/regional/national/international regulations.

3 Composition / Data on components

- Description: aqueous solution

<table>
<thead>
<tr>
<th>CAS: 7697-37-2</th>
<th>nitric acid</th>
<th>C, O; R 8-35</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-714-2</td>
<td>Danger: 3.2/1A</td>
<td></td>
</tr>
<tr>
<td>Index number: 007-004-00-1</td>
<td>Warning: 2.13/3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7782-61-8</th>
<th>iron(II) nitrate nonahydrate</th>
<th>Xi, O; R 8-36/38</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 233-899-5</td>
<td>Warning: 3.2/2, 3.3/2A</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7732-18-5</th>
<th>water, distilled, conductivity or of similar purity</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-791-2</td>
<td>RTECS: ZC 0110000</td>
</tr>
</tbody>
</table>

REACH - pre-registered substances All components are REACH pre-registered.

Additional information: For the wording of the listed risk phrases refer to section 16.

4 First aid measures

- General information:
  Immediately remove any clothing soiled by the product.
  Do not leave affected persons unattended.

- After inhalation: Supply fresh air or oxygen; call for doctor.

- After skin contact:
  Immediately wash with polyethylene glycol 400.
  Immediately rinse with plenty of water.
  Immediate medical treatment necessary. Failure to treat burns can prevent wounds from healing.

- After eye contact:
  Rinse opened eye for several minutes (15 min) under running water.
  Call a doctor immediately.

- After swallowing:
  Do not induce vomiting; immediately call for medical help.
  Rinse out mouth and then drink 1-2 glasses of water.

- The following symptoms may occur:
  after inhalation:
  coughing
  Danger of impaired breathing.

  after swallowing:
  pain
  strong caustic effect
  methaemoglobinaemia
  Danger of circulatory collapse.
Trade name: DEHA 2 Reagent Solution

vomiting
bloody diarrhoea
cramps

· Danger:
  Danger of gastric perforation.
  Danger of pulmonary edema.

· Treatment
  Later observation for pneumonia and pulmonary edema.

5 Fire fighting measures

· Suitable extinguishing agents: Use fire fighting measures that suit the environment.

· Special hazards caused by the material, its products of combustion or resulting gases:

  Formation of toxic gases is possible during heating or in case of fire.

  Nitrogen oxides (NOx)

· Protective equipment:

  Wear fully protective suit.
  Wear self-contained respiratory protective device.

· Additional information

  Dispose of fire debris and contaminated fire fighting water in accordance with official regulations.
  Collect contaminated fire fighting water separately. It must not enter the sewage system.

6 Accidental release measures

· Person-related safety precautions:

  Ensure adequate ventilation
  Wear protective equipment. Keep unprotected persons away.

· Measures for environmental protection: Do not allow product to reach sewage system or any water course.

· Measures for cleaning/collection:

  Dilute with plenty water.
  Neutralize with diluted sodium hydroxide solution or by throwing on lime sand, lime or sodium carbonate.
  Send for recovery or disposal in suitable receptacles.
  Dispose contaminated material as waste according to item 13.
  Ensure adequate ventilation.

7 Handling and storage

· Handling:

  Information for safe handling:
  Open and handle receptacle with care.
  Prevent formation of aerosols.
  Ensure good ventilation/exhaustion at the workplace.

  Information about protection against explosions and fires: The product is not flammable.

· Storage:

  Requirements to be met by storerooms and receptacles: Store in a cool location.

  Information about storage in one common storage facility:
  store away from metals
  Store away from flammable substances.
  Store away from reducing agents.

  Further information about storage conditions:
  Keep receptacle tightly sealed.
  Protect from heat and direct sunlight.
  Protect from humidity and water.
Protect from exposure to the light.

**Recommended storage temperature:** 20°C +/- 3° (approx. 68°F)

---

**8 Exposure controls and personal protection**

- **Additional information about design of technical systems:** No further data; see item 7.
- **Components with limit values that require monitoring at the workplace:**

<table>
<thead>
<tr>
<th>Code</th>
<th>PEL (USA)</th>
<th>REL (USA)</th>
<th>TLV (USA)</th>
<th>IOELV (European Union)</th>
<th>EL (Canada)</th>
<th>EV (Canada)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7697-37-2 nitric acid (10%-20%)</td>
<td>5 mg/m³, 2 ppm</td>
<td>Short-term value: 10 mg/m³, 4 ppm</td>
<td>Long-term value: 5 mg/m³, 2 ppm</td>
<td>Short-term value: 2.6 mg/m³, 1 ppm</td>
<td>Short-term value: 4 ppm</td>
<td>Short-term value: 10 mg/m³, 4 ppm</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

- **Additional information:** The lists that were valid during the creation were used as basis.

- **Personal protective equipment:**
  - **General protective and hygienic measures:**
    - Keep away from foodstuffs, beverages and feed.
    - Immediately remove all soiled and contaminated clothing.
    - Wash hands before breaks and at the end of work.
    - Do not inhale gases / fumes / aerosols.
    - Avoid contact with the eyes and skin.
    - Do not eat, drink, smoke or sniff while working.
  - **Breathing equipment:** Use respiratory protective device against the effects of fumes/dust/aerosol.
  - **Recommended filter device for short term use:** Filter E
  - **Protection of hands:**
    - Acid resistant gloves
    - Preventive skin protection by use of skin-protecting agents is recommended.
    - After use of gloves apply skin-cleaning agents and skin cosmetics.
  - **Material of gloves**
    - Nitrile rubber, NBR
    - Recommended thickness of the material: ≥ 0.11 mm
  - **Penetration time of glove material**
    - The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
    - Value for the permeation: Level ≥ 1 (10 min)
  - **Eye protection:** Tightly sealed goggles
  - **Body protection:** Acid resistant protective clothing

---

**9 Physical and chemical properties**

- **Odor Threshold:** Not applicable.
- **Form:** Fluid
- **Color:** Colorless
- **Odor:** Pungent
- **Melting point/Melting range:** Undetermined.
- **Boiling point/Boiling range:** > 83°C (> 181°F)
- **Freezing Point:** Not applicable.

---
Material Safety Data Sheet
acc. to ISO/DIS 11014

Trade name: DEHA 2 Reagent Solution

- Flash point: Not applicable.
- Flammability (solid, gaseous):
  Upper Flammable Limit: Not applicable.
  Lower Flammable Limit: Not applicable.
- Ignition temperature: Undetermined.
- Sensitivity to Mechanical Impact: None
- Sensitivity to Static Discharge: None
- Auto igniting: Product is not selfigniting.
- Danger of explosion: Product does not present an explosion hazard.
- Vapor Density: Not applicable.
- Specific Gravity: Not applicable.
- Density at 20°C (68°F): 1.076 g/cm³
- Solubility in / Miscibility with Water: Fully miscible.
- Coefficient of Water / Oil Distribution: Not applicable.
- pH-value at 20°C (68°F): < 1
- Solvent content:
  Organic solvents: 0.0 %
  Water: > 80 %
- Solids content: < 5 %

10 Stability and reactivity
- Thermal decomposition / conditions to be avoided: To avoid thermal decomposition do not overheat.
- Materials to be avoided:
  alkali metals
  ammonia (NH3)
  alkalis
  acids
  metals
  organic solvents
  alcohols
  reducing agents
- Dangerous reactions
  Corrosive action on metals.
  Reacts with metals forming hydrogen (Danger of explosion!)
- Dangerous products of decomposition:
  nitrogen oxides
  see chapter 5

11 Toxicological information
- Acute toxicity: Quantitative data on the toxicity of the preparation are not available.
- LD/LC50 values that are relevant for classification:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Oral LDLo (IUCLID)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7697-37-2 nitric acid</td>
<td>430 mg/kg (human))</td>
</tr>
</tbody>
</table>

(Contd. on page 6)
Trade name: DEHA 2 Reagent Solution

<table>
<thead>
<tr>
<th>7782-61-8 iron(III) nitrate nonahydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral LD50</td>
</tr>
</tbody>
</table>

- **Primary irritant effect:**
  - **on the skin:** Caustic effect on skin and mucous membranes.
  - **on the eye:** Strong caustic effect
  - **Sensitization:** No sensitizing effects known.

- **Additional toxicological information:**
  - The product shows the following dangers according to internally approved calculation methods for preparations:
    - Corrosive
    - Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.
    - Repeated skin exposure can produce local skin destruction or dermatitis
  - **Carcinogenicity:** NTP? IARC Monographs? OSHA Regulated? see chapter 8 / 15
  - **Teratogenicity:** Not found.
  - **Mutagenicity:** Not found.
  - **Reproductive Toxicity:** Not found.
  - **Synergistic Products:** None

---

### 12 Ecological information

- **Information about elimination (persistence and degradability):**
- **Other information:**
  - Quantitative data on the ecological effect of this preparation are not available.
  - Does not cause biological oxygen deficit.
  - The following statements refer to the individual components.

- **Behavior in environmental systems:**
  - **7697-37-2 nitric acid**
    - log $P(o/w)$ -2.3 ()

- **Mobility and bioaccumulation potential:** Nitrates may contribute to the eutrophication of water supplies

- **Ecotoxicological effects:**
  - **Aquatic toxicity:**
    - LC50 > 500 mg/l (fish) NO3-

  - **7697-37-2 nitric acid**
    - LC50 72 mg/l/96h (Gambusia affinis)
      - (IUCLID)

  - **7782-61-8 iron(III) nitrate nonahydrate**
    - LC50 > 500 mg/l (fish)
    - 10-20 mg/l (Leuciscus idus)

- **Additional ecological information:**
  - **General notes:**
    - Water hazard class 1 (Self-assessment): slightly hazardous for water
    - Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
    - Must not reach bodies of water or drainage ditch undiluted or unneutralized.
    - Also poisonous for fish and plankton in water bodies.
    - Rinse off of bigger amounts into drains or the aquatic environment may lead to decreased pH-values. A low pH-value harms aquatic organisms. In the dilution of the use-level the pH-value is considerably increased, so that after the use of the product the aqueous waste, emptied into drains, is only low water-dangerous.
13 Disposal considerations

· Product:
  Recommendation: Must not be disposed of together with household garbage. Do not allow product to reach sewage system. Hand over to hazardous waste disposers.

· Uncleaned packagings:
  Recommendation: Disposal must be made according to official regulations.
  Recommended cleansing agent: Water, if necessary with cleansing agents.

14 Transport information

· TDG / DOT regulations:
  Hazard class: 8
  Identification number: UN2031
  Packing group: II
  Proper shipping name (technical name): NITRIC ACID
  Label: 8

· Land transport ADR/RID (cross-border):
  ADR/RID class: 8 (C1) Corrosive substances
  Danger code (Kemler): 80
  UN-Number: 2031
  Packaging group: II
  Description of goods: 2031 NITRIC ACID
  Limited quantity (LQ): LQ22

· Maritime transport IMDG:
  IMDG Class: 8
  UN Number: 2031
  Label: 8
  Packaging group: II
  EMS Number: F-A,S-Q
  Marine pollutant: No
  Proper shipping name: NITRIC ACID

· Air transport ICAO-TI and IATA-DGR:
  ICAO/IATA Class: 8
  UN/ID Number: 2031
  Label: 8
  Packaging group: II
  Proper shipping name: NITRIC ACID

· Canadian TDG Class: 8

UN "Model Regulation": UN2031, NITRIC ACID, 8, II

15 Regulations

· Sara

· Section 355 (Extremely hazardous substances):
  7697-37-2 nitric acid

· Section 313 (Specific toxic chemical listings):
  7697-37-2 nitric acid
Material Safety Data Sheet
acc. to ISO/DIS 11014

Printing date 03/03/2010
Reviewed on 03/03/2010

Trade name: DEHA 2 Reagent Solution

- **TSCA (Toxic Substances Control Act):**
  - 7732-18-5 water, distilled, conductivity or of similar purity
  - 7697-37-2 nitric acid

- **Proposition 65**

  - **Chemicals known to cause cancer:**
    None of the ingredients is listed.

  - **Chemicals known to cause reproductive toxicity for females:**
    None of the ingredients is listed.

  - **Chemicals known to cause reproductive toxicity for males:**
    None of the ingredients is listed.

  - **Chemicals known to cause developmental toxicity:**
    None of the ingredients is listed.

- **Canadian Ingredient Disclosure List**

  - **Limit 0,1%**
    None of the ingredients is listed.

  - **Limit 1%**
    Iron, water-soluble salts, n.o.s.
    - 7697-37-2 nitric acid

- **Canadian Domestic Substances List (DSL)**
  - 7732-18-5 water, distilled, conductivity or of similar purity
  - 7697-37-2 nitric acid

- **EPA (Environmental Protection Agency)**
  None of the ingredients is listed.

- **IARC (International Agency for Research on Cancer)**
  None of the ingredients is listed.

- **NTP (National Toxicology Program)**
  None of the ingredients is listed.

- **NIOSH-Ca (National Institute for Occupational Safety and Health)**
  None of the ingredients is listed.

- **OSHA-Ca (Occupational Safety & Health Administration)**
  None of the ingredients is listed.

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

- **ENCS List (MITI):**
  - 7697-37-2 nitric acid 1-394

- **Standard for the Uniform Scheduling of Drugs and Poisons**
  - 7697-37-2 nitric acid S5, S6

- **Product related hazard informations:**
  The product has been classified and marked in accordance with directives on hazardous materials.

- **Hazard symbols:**
  C Corrosive

- **Hazard-determining components of labelling:**
  nitric acid

- **Risk phrases:**
  34 Causes burns.
Trade name: DEHA 2 Reagent Solution

- **Safety phrases:**
  20 When using do not eat or drink.
  23 Do not breathe fumes / aerosol
  26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
  36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
  45 In case of accident or if you feel unwell, seek medical advice immediately.
  60 This material and its container must be disposed of as hazardous waste.

- **Information about limitation of use:** Employment restrictions concerning young persons must be observed.

- **Water hazard class:** Water hazard class 1 (Self-assessment): slightly hazardous for water.

- **CPR Classification:** Class E

- **This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR**

---

### 16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- **Relevant R-phrases**
  35 Causes severe burns.
  36/38 Irritating to eyes and skin.
  8 Contact with combustible material may cause fire.

- **Recommended restriction of use:** professional/industrial use only

- **Contact:** Orbeco-Hellige, Inc., Quality Assurance Dept., Phone: 941-756-6410

- **Abbreviations and acronyms:**
  - EC50: effective concentration, 50 percent (in vivo)
  - ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
  - RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
  - IMDG: International Maritime Code for Dangerous Goods
  - DOT: US Department of Transportation
  - IATA: International Air Transport Association
  - IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)
  - ICAO: International Civil Aviation Organization
  - ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO)
  - GHS: Globally Harmonized System of Classification and Labelling of Chemicals
  - NFPA: National Fire Protection Association (USA)
  - WHMIS: Workplace Hazardous Materials Information System (Canada)
  - LC50: Lethal concentration, 50 percent
  - LD50: Lethal dose, 50 percent

- **Sources**
  - IUCLID (International Uniform Chemical Information Database)
  - Data arise from manufacturers' data sheets, reference works and literature.

- **Data compared to the previous version altered.**