1 Product and Company Identification

Product name: Fe-12cc11
Other product names: None
Product use: Iron Oxide Etchant

Manufacturer: OM Group - Ultra Pure Chemicals
CYANTEK CORPORATION
3055 Osgood Court
Fremont, CA 94538
(510) 651-3341

24 Hour Emergency Telephone Number:
CHEMTREC: (800) 424-9300 (North America); (703) 527-3887 (Int’l.)

2 Hazards Identification

GHS classification:
Corrosive to metals: Category 1
Acute toxicity (oral): Category 4
Acute toxicity (inhalation): Category 5
Skin corrosion/irritation: Category 1A
Serious eye damage/eye irritation: Category 1

Signal word: Danger
Hazard statements: Harmful if swallowed or inhaled. Causes severe skin burns and eye damage. May be corrosive to metals.

Precautionary statements:
Absorb spillage to prevent material damage. Store in plastic containers. Wash thoroughly after handling. Do not eat, drink or smoke when using this product.
If swallowed: Call a POISON CENTER or doctor/physician. Do not induce vomiting. Wear gloves/protective clothing/face and eye protection.
If on skin: Remove all contaminated clothing. Wash with plenty of water. Dispose of contaminated clothing. Avoid breathing vapors. Use only in a well-ventilated area.
If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician.
Dispose of contents/container in accordance with local/national regulations.

Pictograms:
3 Composition/Information on Ingredients:

- Chemical formula: HCl + FeCl2 + H2O
- Hazardous components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percent by wt.</th>
<th>CAS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric Acid</td>
<td>23%</td>
<td>7647-01-0</td>
</tr>
<tr>
<td>Ferrous Chloride</td>
<td>10%</td>
<td>7758-94-3</td>
</tr>
<tr>
<td>Water</td>
<td>67%</td>
<td>7732-18-5</td>
</tr>
</tbody>
</table>

4 First Aid Measures

- **Inhalation**: Supply fresh air; consult doctor in case of complaint.
- **Skin contact**: Flush affected areas with plenty of water, remove contaminated clothing, get medical attention if irritation persists.
- **Eye contact**: Rinse opened eyes for several minutes under running water. Immediately consult a doctor.
- **Ingestion**: Give large amounts of water. Do NOT induce vomiting or aspiration into the lungs may occur and may cause permanent injury. Do NOT give water to an unconscious patient. Consult a doctor immediately.

5 Fire Fighting Measures

- **Suitable extinguishing agents**: CO2, or water spray. Fight larger fires with water spray. Use water spray to cool exposed containers.
- **Specific hazards**: Avoid contact with caustics.
- **Protective equipment**: Wear goggles, rubber gloves and boots, self contained breathing apparatus, and acid protective clothing.

6 Accidental Release Measures

- **Personal precautions**: Wear goggles, rubber boots and gloves, and acid protective clothing.
- **Environmental precautions**: Do not allow substance to enter sewage system, surface or ground water.
- **Methods for cleaning up**: Contain the spill by diking/absorbing with liquid-binding material (sand, diatomite, acid binders, universal binders). Ensure adequate ventilation. Dispose of material in accordance with local, regional, or national regulations.

7 Handling and Storage

- Ensure good ventilation/exhaustion at the workplace.
- Store between 50 and 77 Degrees F.
- Keep containers upright and tightly sealed.
- Store away from strong caustics.
8 Exposure Controls and Personal Protection

General protective and hygienic measures: Keep away from foodstuffs and beverages. Immediately remove all soiled and contaminated clothing Wash hands before breaks and at the end of work. Avoid contact with the eyes and skin.
Respiratory equipment: In case of brief exposure or low pollution use acid mist respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
Protection of hands: Acid resistant gloves.
Eye protection: Tightly sealed goggles or face shield.
Body protection: Acid resistant protective work clothing.

Exposure guidelines and limits:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>Other Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric Acid</td>
<td>5 ppm (ceiling)</td>
<td>5 ppm (ceiling)</td>
<td>50 ppm (IDLH)</td>
</tr>
<tr>
<td>Ferrous Chloride</td>
<td>1 mg/m3 (TWA)*</td>
<td>None listed</td>
<td>None listed</td>
</tr>
</tbody>
</table>

* Soluble iron salt as Fe

TLV: Threshold limit value
PEL: Permissible exposure limit
TWA: Time weighted average (8 hours)
IDLH: Immediately dangerous to life and health

9 Physical and Chemical Properties:

Physical state: Liquid
Color: Green
Odor: Slight Chlorine odor
Odor threshold: Unknown
pH: <1
Melting point/freezing point: Unknown
Initial boiling point and boiling range: Unknown
Flash point: Not applicable
Evaporation rate: Unknown
Lower explosion limits (LEL): Not applicable
Upper explosion limits (UEL): Not applicable
Vapor pressure (mm Hg): Unknown
Vapor density (air = 1): Unknown
Relative density at 20 °C (water = 1): 1.1 g/cm3
Solubility in water: 100%
Partition coefficient (n-Octanol/water): Unknown
Auto-ignition temperature: Not applicable
Decomposition temperature: Not applicable
Viscosity: Unknown
10 Stability and Reactivity

Dangerous reactions: Reacts with caustics and water reactive materials.
Danger of explosion: None
Thermal decomposition: Hydrogen Chloride is generated.
Dangerous products of decomposition: Releases toxic Hydrogen Chloride gas if heated to partial evaporation.
Hazardous polymerization: Does not occur

11 Toxicological Information

Toxicological data:

Hydrochloric Acid: LC50 (inhalation - rat) 3124 ppm (1 hour),
LD50 (oral - rabbit) 900 mg/kg

Ferrous Chloride: LD50 (oral - rat) 450 mg/kg

Potential side effects:

Eyes: Direct contact with eyes may cause severe burns.
Skin: Direct contact with the skin may cause irritation or damaging burns.
Ingestion: Swallowing may cause severe burns to the esophagus and digestive tract.
Inhalation: Respiratory tract irritation.
Acute health hazards: Repeated or prolonged contact may cause skin and respiratory system irritation.
Chronic health hazards: Chronic inhalation of mist may produce respiratory system irritation.
Medical conditions generally aggravated by exposure: Respiratory and skin diseases may predispose one to acute and chronic effects.
Sensitization: No sensitizing effects known.

12 Ecological Information:

Eco-toxicity/bioaccumulation data:

Hydrochloric Acid: LC50 (salt water shrimp) 100 to 330 ppm (48 hrs.),
TLm (mosquito fish) 282 ppm (96 hours)
Ferrous Chloride: None available

General notes: Do not allow product to reach ground water, water course or sewage system. Danger to drinking water if even small quantities leak into the ground.
### 13 Disposal Considerations

Dispose of product (including containers) in accordance with applicable regulations.

### 14 Transportation Information

- **Land (CFR 49)**, Maritime (IMDG), Air (ICAO)
- **Class**: 8 (Corrosive Liquid)
- **UN Number**: 1789
- **Proper Shipping Name**: Hydrochloric Acid Solution
- **Packing Group**: II
- **Marine pollutant**: No

### 15 Regulatory Information

- **CERCLA Hazardous Substances (with reportable quantity)**: Hydrochloric Acid (5000#), Ferrous Chloride (100#)
- **Extremely Hazardous Substances (with threshold quantity)**: None
- **Toxic Chemicals (Section 311)**: Hydrochloric Acid
- **TSCA Inventory**: All ingredients on TSCA inventory
- **Proposition 65 List**: None
- **Clean Water Act Hazardous Substance List (with reportable quantity)**: Hydrochloric Acid (5000#), Ferrous Chloride (100#)
- **Clean Air Act Synthetic Organic Chemical (CAA SOCMI)**: None
- **Clean Air Act Accidental Release Prevention Substance, section 112 r (with threshold quantity)**: Hydrochloric Acid (5000#)
- **PSM Highly Hazardous Chemical List (with threshold quantity)**: Hydrochloric Acid (5000#)
- **Clean Air Act (CAA) Hazardous Air Pollutants**: Hydrochloric Acid (HAP code X)

### 16 Other Information

- **MSDS document number**: MSDS 17-100
- **Current date and revision**: 9/19/08, revision D
- **Supersedes date and revision**: 11/20/03, revision C
- **MSDS author**: Gregg Harvey

**Note**: This Material Safety Data Sheet was created using the Globally Harmonized System (GHS) format for Safety Data Sheets (SDS).

**Disclaimer**: This information is based upon information and sources available at the time of preparation. This shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship. It is the obligation of the user to determine product suitability and comply with the requirements of all applicable laws regarding use and disposal of this product.