Not appropriate for regulatory submission. Please visit www.spectrumchemical.com or contact Tech Services for the most up-to-date information contained in this information package.
Dear Customer,

Thank you for your interest in Spectrum’s quality products and services.

Spectrum has been proudly serving our scientific community for over 45 years. It is our mission to manufacture and distribute fine chemicals and laboratory products with Quality and delivery you can count on every time.

To accomplish our mission, Spectrum utilizes our sourcing leverage and supplier qualification expertise in offering one of the industry’s most comprehensive line of fine chemical products under one brand, in packaging configurations designed to meet your research and production requirements. Our product grades include: USP, NF, BP, EP, JP, FCC, ACS, KSA, Reagent grade, as well as DEA controlled substances. We operate facilities in the United States on the East Coast, West Coast, as well as in Shanghai, China in order to provide the best logistical support for our customers.

At Spectrum, Quality is priority number one. Suppliers with the best qualifications are preferred and we employ full-functioning in-house analytical laboratories at each of our facilities. Our facilities and systems are USFDA registered and ISO certified. We frequently host customer audits and cherish opportunities for improvements. Quality is engrained into our culture. Quality is priority number one.

In the following pages, we have designed and prepared documented scientific information to aid you in your initial qualification or your continual use of our products. Please do not hesitate to contact us if further information or the most up-to-date documentation is desired from any of the covered areas.

We appreciate your business and we look forward to hearing from you.

Sincerely,

Alan Wang, MSQA, ASQ CQA
Senior Manager of Technical Services
technicalservices@spectrumchemical.com
HY106, Hydrochloric Acid, 37 Percent, FCC

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- Product Specification
- Safety Data Sheet (SDS)
- Manufacturer
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- Certification of current Good Manufacturing Practices (cGMP)
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- Product Allergen Statement
- Product Aflatoxin Statement
- General Label Information – Sample Label
- Product Certificate of Analysis Sample(s)
- General Lot Numbering System Guidance
- Stability – Shelf Life Guidance
<table>
<thead>
<tr>
<th>Item Number</th>
<th>HY106</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Hydrochloric Acid, 37 Percent, FCC</td>
</tr>
<tr>
<td>CAS Number</td>
<td>7647-01-0</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>HCl</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>36.46</td>
</tr>
<tr>
<td>MDL Number</td>
<td></td>
</tr>
<tr>
<td>Synonyms</td>
<td>Chlorhydric Acid; Muriatic Acid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test</th>
<th>Specification</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSAY</td>
<td></td>
<td>36.0 - 38.0 %</td>
<td>TO PASS TEST</td>
</tr>
<tr>
<td>COLOR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPECIFIC GRAVITY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRON (Fe)</td>
<td></td>
<td></td>
<td>5 mg/kg</td>
</tr>
<tr>
<td>LEAD (Pb)</td>
<td></td>
<td></td>
<td>1 mg/kg</td>
</tr>
<tr>
<td>MERCURY</td>
<td></td>
<td></td>
<td>0.10 mg/kg</td>
</tr>
<tr>
<td>NONVOLATILE RESIDUE</td>
<td></td>
<td></td>
<td>0.5 %</td>
</tr>
<tr>
<td>ORGANIC COMPOUNDS</td>
<td></td>
<td></td>
<td>TO PASS TEST</td>
</tr>
<tr>
<td>OXIDIZING SUBSTANCES (as Cl2)</td>
<td></td>
<td></td>
<td>0.003 %</td>
</tr>
<tr>
<td>REDUCING SUBSTANCES (as SO3)</td>
<td></td>
<td></td>
<td>0.007 %</td>
</tr>
<tr>
<td>SULFATE</td>
<td></td>
<td></td>
<td>0.5 %</td>
</tr>
<tr>
<td>IDENTIFICATION</td>
<td></td>
<td></td>
<td>TO PASS TEST</td>
</tr>
<tr>
<td>EXPIRATION DATE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. IDENTIFICATION

Product identifier
Product code: HY106
Product Name: HYDROCHLORIC ACID, 37 PERCENT, FCC

Other means of identification
Synonyms: Muriatic Acid; Chlorohydric acid; Spirits of salt; Acide chlorhydrique (French)
CAS #: 7647--01-0
RTECS #: MW4025000
CI#: Not available

Recommended use of the chemical and restrictions on use
Recommended use: In the production of chloride; refining ore in the production of tin and tantalum; for the neutralization of basic systems; as a laboratory reagent; as a catalyst and solvent in organic synthesis; for oil and gas-well treatment; in removing scale from boilers and heat exchange equipment; pharmaceutical aid (acidifier); in the manufacture of phosphoric acid and in the production of ammonium chloride; metal treating agent (steel pickling); in food processing as a starch modifier; in the manufacturer of sodium glutamate; in the manufacturer of gelatin; in the conversion of cornstarch to syrup; in the brewing industry; in sugar refining; in the manufacture of fertilizers, dyes and dyestuffs, artificial silks, pigments for paints; in electroplating, leather tanning, the photographic industry, in soap refining, in the textile industry, in the rubber industry; in petroleum activation; metal cleaning operations; recovery of zinc from galvanized iron scrap.

Uses advised against: No information available

Supplier: Spectrum Chemicals and Laboratory Products, Inc.
14422 South San Pedro St.
Gardena, CA  90248
(310) 516-8000

Order Online At: https://www.spectrumchemical.com

Emergency telephone number: Chemtrec 1-800-424-9300
Contact Person: Martin LaBenz (West Coast)
Contact Person: Regina Wachenheim (East Coast)

2. HAZARDS IDENTIFICATION

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Oral Category 4
Acute toxicity - Inhalation (Gases) Category 4
Skin corrosion/irritation Category 1 Sub-category A
Serious eye damage/eye irritation Category 1
Specific target organ toxicity (single exposure) Category 3

**Label elements**

**Danger**

**Hazard statements**
Harmful if swallowed
Harmful if inhaled
Causes severe skin burns and eye damage
May cause respiratory irritation

**Hazards not otherwise classified (HNOC)**
Not Applicable

**Other hazards**
Not available

**Precautionary Statements - Prevention**
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Wear protective gloves/protective clothing/eye protection/face protection

**Precautionary Statements - Response**
Immediately call a POISON CENTER or doctor/physician
Specific treatment (see .? on this label)
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.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell. Immediately call a POISON CENTER or doctor/physician.
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Do NOT induce vomiting

**Precautionary Statements - Storage**
Store locked up
Store in a well-ventilated place. Keep container tightly closed

**Precautionary Statements - Disposal**
Dispose of contents/container to an approved waste disposal plant

**Product code:** HY106  
**Product name:** HYDROCHLORIC ACID, 37 PERCENT, FCC
### 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Weight %</th>
<th>Trade Secret</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>62-64</td>
<td>*</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>7647-01-0</td>
<td>36-38</td>
<td>*</td>
</tr>
</tbody>
</table>

### 4. FIRST AID MEASURES

**First aid measures**

**General Advice:** Poison information centres in each State capital city can provide additional assistance for scheduled poisons (13 1126). Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. First aider needs to protect himself.

**Skin Contact:** Wash off immediately with soap and plenty of water. Continue flushing with plenty of water for at least 15 minutes. Remove all contaminated clothes and shoes. Immediate medical attention is required. Call a physician immediately.

**Eye Contact:** Flush eye with water for 15 minutes. Immediate medical attention is required. Call a physician immediately.

**Inhalation:** Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. WARNING! It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled or ingested material is toxic, infectious or corrosive. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required. Call a physician immediately.

**Ingestion:** Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. If victim is conscious, give water or milk. Immediate medical attention is required. Call a physician or Poison Control Centre immediately.

**Most important symptoms and effects, both acute and delayed**

**Symptoms**

- Severe skin irritation.
- Severe eye irritation.
- Severe skin and eye irritation or burns.
- Irritating to respiratory system.
- Burning sensation of the respiratory tract.
- Coughing.
- Hoarseness.
- Choking sensation.
- Dyspnea (Shortness of breath and difficulty breathing).
- Shallow respiration.
- Can burn mouth, throat, and stomach. May cause salivation.
- Thirst. May cause difficulty swallowing.
- May cause abdominal pain, nausea, vomiting, diarrhea.
- Weak, rapid pulse or rapid heart rate (Tachycardia). Shock.

**Indication of any immediate medical attention and special treatment needed**

**Notes to Physician:** Treat symptomatically

**Protection of first-aiders**

First-Aid Providers: Avoid exposure to blood or body fluids. Wear gloves and other necessary protective clothing. Dispose of contaminated clothing and equipment as bio-hazardous waste

### 5. FIRE-FIGHTING MEASURES

**Extinguishing Media**
5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media: The product is not flammable. If it is involved in a fire, extinguish the fire using an agent suitable for the type of surrounding fire.

Unsuitable Extinguishing Media: No information available.

Specific hazards arising from the chemical

Hazardous Combustion Products: No information available.

Specific hazards:
Contact with metals may evolve flammable hydrogen gas. Calcium carbide reacts with hydrogen chloride gas with incandescence. Uranium phosphide reacts with hydrochloric acid to release spontaneously flammable phosphine. Rubidium acetylene carbide burns with slightly warm hydrochloric acid. Lithium silicide in contact with hydrogen chloride becomes incandescent. When dilute hydrochloric acid is used, gas that is spontaneously flammable in air is evolved. Magnesium boride treated with concentrated hydrochloric acid produces spontaneously flammable gas. Cesium acetylene carbide burns in hydrogen chloride gas. Cesium carbide ignites in contact with hydrochloric acid unless acid is dilute. Hydrogen chloride in contact with the following can cause an explosion, ignition on contact, or other violent/vigorous reaction: Acetic anhydride AgClO + CCl4 Alcohol + hydrogen cyanide, Aluminum-Aluminum-titanium alloys (with HCl vapor), 2-Amino ethanol, Ammonium hydroxide, Calcium carbide Ca3P2 Chlorine + dinitroanilines (evolves gas), Chlorosulfonic acid Cesium carbide Cesium acetylene carbide, 1,1-Difluoroethylene Ethylene diamine Ethylene imine, Fluorine, HClO4 Hexalithium disilicide H2SO4 Metal acetylies or carbides, Magnesium boride, Mercuric sulfate, Oleum, Potassium permanganate, beta-Propiolactone Propylene oxide Rubidium carbide, Rubidium, acetylene carbide Sodium (with aqueous HCl), Sodium hydroxide Sodium tetrascelenium, Sulfonic acid, Tetraselenium tetraneptide, U3P4, Vinyl acetate, Silver perchlorate with carbon tetrachloride in the presence of hydrochloric acid produces trichloromethyl perchlorate which detonates at 40 deg. C.

Special Protective Actions for Firefighters

Specific Methods: No information available.

Special Protective Equipment for Firefighters: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions: Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Use personal protective equipment. Avoid contact with skin, eyes and clothing.
Environmental precautions

Prevent further leakage or spillage if safe to do so. Should not be released into the environment. Do not let product enter drains. Do not flush into surface water or sanitary sewer system. Prevent entry into waterways, sewers, basements or confined areas.

Methods and material for containment and cleaning up

Methods for containment
Stop leak if you can do it without risk.

Methods for cleaning up
Neutralize with Sodium carbonate or Sodium bicarbonate. Dilute with water. Absorb spill with inert material (e.g. vermiculite, dry sand or earth), then place in a suitable chemical waste container. Clean contaminated surface thoroughly.

7. HANDLING AND STORAGE

Precautions for safe handling

Technical Measures/Precautions:
Use only in area provided with appropriate exhaust ventilation. Keep away from incompatible materials.

Safe Handling Advice:
Wear personal protective equipment. Avoid contact with skin, eyes and clothing. Do not ingest. Do not breathe vapors or spray mist. Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities

Technical Measures/Storage Conditions:
Keep container tightly closed in a dry and well-ventilated place. Store at room temperature in the original container. May corrode metallic surfaces. Do not store in uncoated metallic containers. Store in a segregated and approved area. Store away from incompatible materials.

Incompatible Materials:

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

National occupational exposure limits

United States

<table>
<thead>
<tr>
<th>Components</th>
<th>OSHA</th>
<th>NIOSH</th>
<th>ACGIH</th>
<th>AIHA WHEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water - 7732-18-5</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Hydrogen chloride - 7647-01-0</td>
<td>5 ppm Ceiling</td>
<td>5 ppm Ceiling</td>
<td>2 ppm Ceiling</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>7 mg/m³ Ceiling</td>
<td>7 mg/m³ Ceiling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Canada

<table>
<thead>
<tr>
<th>Components</th>
<th>Alberta</th>
<th>British Columbia</th>
<th>Ontario</th>
<th>Quebec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water - 7732-18-5</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Hydrogen chloride - 7647-01-0</td>
<td>2 ppm Ceiling</td>
<td>2 ppm Ceiling</td>
<td>2 ppm Ceiling</td>
<td>5 ppm Ceiling</td>
</tr>
<tr>
<td></td>
<td>3 mg/m³ Ceiling</td>
<td></td>
<td></td>
<td>7.5 mg/m³ Ceiling</td>
</tr>
</tbody>
</table>

Australia and Mexico

<table>
<thead>
<tr>
<th>Components</th>
<th>Australia</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>7732-18-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen chloride 7647-01-0</td>
<td>None</td>
<td>5 ppm Ceiling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 mg/m³ Ceiling</td>
</tr>
</tbody>
</table>

Product code: HY106  Product name: HYDROCHLORIC ACID, 37 PERCENT, FCC
Appropriate engineering controls

Engineering measures to reduce exposure: Ensure adequate ventilation. Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors and mist below their respective threshold limit value.

Individual protection measures, such as personal protective equipment
Personal Protective Equipment

<table>
<thead>
<tr>
<th>Type</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye protection</td>
<td>Face-shield</td>
</tr>
<tr>
<td>Skin and body protection</td>
<td>Chemical resistant suit.</td>
</tr>
<tr>
<td></td>
<td>Gloves.</td>
</tr>
<tr>
<td></td>
<td>boots.</td>
</tr>
<tr>
<td>Respiratory protection</td>
<td>Vapor respirator.</td>
</tr>
<tr>
<td></td>
<td>Be sure to use an approved/certified respirator or equivalent.</td>
</tr>
<tr>
<td>Hygiene measures</td>
<td>Avoid contact with skin, eyes and clothing. When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product.</td>
</tr>
</tbody>
</table>

9. PHYSICAL AND CHEMICAL PROPERTIES
9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Liquid.

Odor: Pungent. Irritating.

Molecular/Formula weight: No information available

Flash Point Tested according to: Not applicable

Autoignition Temperature (°C/°F): No information available

Boiling point/range(°C/°F):
- 108.58 C @ 760 mm Hg (for 20.22% HCl in water)
- 83 C @ 760 mm Hg (for 31% HCl in water)
- 50.5 C (for 37% HCl in water)

Density (g/cm3): No information available

Evaporation rate: No information available

Odor threshold (ppm):
- 0.25 to 10 ppm

Miscibility: No information available

Appearance: No information available

Taste: No information available

Flash point (°C): Not applicable

Lower Explosion Limit (%): No information available

pH: No information available

Vapor pressure @ 20°C (kPa): No information available

Vapor density: 1.267

Partition coefficient (n-octanol/water): No information available

Solubility: Soluble in Ether, Soluble in Water

Color: Colorless. Light yellow.

Formula: HCl

Flashpoint (°C/°F): Not applicable

Specific gravity:
- 1.1- 1.19 (Water = 1)
- 1.10 (20% and 22% HCl solutions)
- 1.12 (24% HCl solution)
- 1.15 (29.57% HCl solution)
- 1.16 (32% HCl solution)
- 1.186 - 1.19 (37% and 38% HCl solutions)

Flash Point Tested according to: Not applicable

Melting point/range(°C/°F):
- -62.25°C (-80°F) (20.69% HCl in water)
- -46.2 C (31.24% HCl in water)
- -25.4 C (39.17% HCl in water)

Physical state: Liquid.

Partition coefficient (n-octanol/water): No information available

Viscosity: No information available

Odor: Pungent. Irritating.

Miscibility: No information available

Solubility: Soluble in Ether, Soluble in Water

Formula: HCl

10. STABILITY AND REACTIVITY

Reactivity
10. STABILITY AND REACTIVITY

For Hydrogen chloride or Hydrochloric Acid:
Reacts with most metals to produce flammable Hydrogen gas.
Sodium reacts very violently with gaseous hydrogen chloride.
Calcium phosphide and Hydrochloric acid undergo a very energetic reaction.
Hydrogen chloride reacts with oxidizers releasing chlorine gas.
Hydrogen chloride gas is emitted when Hydrochloric acid comes in contact with Sulfuric acid.
Adsorption of Hydrochloric acid onto Silicon dioxide results in exothermic reaction.

Hydrogen chloride causes aldehydes and epoxides to violently polymerize.
Reacts violently with bases, oxidizers forming toxic chlorine gas.
Reacts, often violently or vigorously or exothermically, with acetic anhydride, active metals, aliphatic amines, alkanolamines, alkylene oxides, aromatic amines, amides, 2-aminoethanol, ammonia, ammonium hydroxide, calcium phosphate, chlorosulfonic acid, ethylene diamine, ethyleneimine, epichlorohydrin, isocyanates, metal acetylides, oleum, organic anhydrides, perchloric acid, 3-propiolactone, uranium phosphide, sulfuric acid, vinyl acetate, vinylidene fluoride, alcohols + hydrogen cyanide, Aluminum phosphide, Aluminum-titanium alloys, 2-Amino ethanol, Ammonium hydroxide, Ammonium, 1,4-Benzoxazine diimine, Cesium telluroacetylated, Chlorine + dinitroanilines, Chloroacetaldehyde oxime, Cyanogen chloride, 1,1-Difluoroethylene, dinitroanilines, Ethylene, Ethyl 2-formylpropionate oxime, Hexalithium disilicide, Hydrogen peroxide, Methyl vinyl ether, Nitric acid + glycerol, Potassium, Potassium permanganate, beta-Propiolactone, Propylene oxide, Rubidium acetylide, Silver chlorite, Sodium 2-allyloxy-6-nitrophenylpyruvate oxime, Sodium hydroxide, Sodium teranitride, 2,4,6-Tri(2-acetylhydrazino)-1,3,5-trinitrobenzene, Sulfonic acid, Cesium cyanotridecahydrodecarbore(2-), Potassium ferricyanide, Vinylidene fluoride, Potassium ferrocyanide, Ammonium hexacyanoferrate (II).
Reaction with oxidizers such as permanganates, chlorates, chlorites, and hypochlorites may produce chlorine or bromine gas.
Reacts vigorously with alkalies and with many organic materials.
Cesium acetylene carbide burns in hydrogen chloride gas.
Lithium silicide in contact with hydrogen chloride becomes incandescent.
Magnesium boride in contact with concentrated hydrochloric acid produces spontaneously flammable gas.
Rubidium acetylene carbide burns with slightly warm hydrochloric acid.
Rubidium carbide ignites in contact with hydrochloric acid unless acid is dilute.
Uranium phosphide reacts with hydrochloric acid to release spontaneously flammable phosphine.
Calcium carbide reacts with hydrogen chloride gas with incandescence.
Absorption of gaseous hydrogen chloride on mercuric sulfate becomes violent @ 125 deg C.
Reaction of silver perchlorate with carbon tetrachloride in presence of small amount of hydrochloric acid produces trichloromethyl perchlorate, which detonates @ 40 deg C.
Cesium carbide ignites in contact with hydrochloric acid unless acid is dilute.
Hydrochloric acid in the presence of alcohol and glycols results in dehydration reactions.
Hydrogen chloride gas can react with formaldehyde to form bis(chloromethyl)ether, a human carcinogen.
Exothermic reaction with water
Attacks some plastics, rubber, and coatings.

Chemical stability
Stability: Stable at normal conditions

Possibility of Hazardous Reactions: Hazardous polymerization does not occur

Conditions to avoid: Stable at normal conditions


Other Information

Corrosivity: Severe corrosive effect on 304 Stainless Steel. Severe corrosive effect on 316 Stainless Steel. Severe corrosive effect on Copper and copper alloys. Severe corrosive effect on Bronze. Severe corrosive effect on Brass.

Special Remarks on Corrosivity: No information available

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Principal Routes of Exposure:
Skin. Inhalation. Ingestion.

Acute Toxicity
The following values are calculated based on chapter 3.1 of the GHS document.
ATEmix (inhalation-gas) 4115-7810ppm (4-hr)

Component Information

Water - 7732-18-5
LD50/oral/rat = > 90 mL/kg Oral LD50 Rat
LD50/oral/mouse = No information available
LD50/dermal/rabbit = No information available
LD50/dermal/rat = No information available
LC50/inhalation/rat = No information available
LC50/inhalation/mouse = No information available
Other LD50 or LC50 information = No information available

Hydrogen chloride - 7647-01-0
LD50/oral/rat = 700 mg/kg Oral LD50 Rat (test substance: 31.5% hydrochloric acid solution)
LD50/oral/mouse = No information available
LD50/dermal/rabbit = > 5010 mg/kg Dermal LD50 Rabbit (Test substance: 31.5% hydrochloric acid solution)
LD50/dermal/rat = No information available
LC50/inhalation/rat = 3124 ppm Inhalation LC50 Rat 1 h
1562 ppm 4 h
LC50/inhalation/mouse = 1108 ppm 1 h
Other LD50 or LC50 information = 900 mg/kg oral LD50 Rabbit (no information on test substance)

Product Information

LD50/oral/rat =
VALUE- Acute Tox Oral = 700mg/kg

LD50/oral/mouse =
Value - Acute Tox Oral = No information available

LD50/dermal/rabbit
VALUE-Acute Tox Dermal = >5010mg/kg

LD50/dermal/rat
VALUE -Acute Tox Dermal = No information available

LC50/inhalation/rat
VALUE-Vapor = No information available
VALUE-Gas = No information available
VALUE-Dust/Mist = No information available

LC50/Inhalation/mouse
VALUE-Vapor = No information available
VALUE - Gas = No information available
VALUE - Dust/Mist = No information available

Symptoms
Skin Contact: Causes skin burns.
Eye Contact: Causes eye burns.

Inhalation
Harmful by inhalation. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract. Inhalation of hydrochloric acid fumes produces nose, throat, and laryngeal irritation, and burning, pain and inflammation, coughing, sneezing, choking sensation, hoarseness, laryngeal spasms, upper respiratory tract edema, chest pains, as well as headache, and palpitations. Inhalation of high concentrations can result in corrosive burns, necrosis of bronchial epithelium, constriction of the larynx and bronchi, nasospetal perforation, glottal closure, dyspnea, bronchitis. Chemical pneumonitis and pulmonary edema can also occur, particularly if exposure is prolonged. May affect the liver.

Ingestion
Harmful if swallowed. Causes irritation and burning, ulceration, or perforation of the gastrointestinal tract and resultant peritonitis, gastric hemorrhage and infection. Can also cause nausea, vomiting (with "coffee ground" emesis), diarrhea, thirst, difficulty swallowing, salivation, chills, fever, uneasiness, shock, strictures and stenosis (esophageal, gastric, pyloric). May affect behavior (excitement), the cardiovascular system (weak rapid pulse, tachycardia), respiration (shallow respiration), and urinary system (kidneys- renal failure, nephritis). Acute exposure via inhalation or ingestion can also cause erosion of tooth enamel.

Aspiration hazard
No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Chronic Toxicity
Prolonged or repeated inhalation and/or ingestion may affect liver, and cause bleeding of nose and gums, nasal and oral mucosal ulceration, conjunctivitis. It may also affect respiratory tract (changes in pulmonary function, chronic bronchitis, overt respiratory tract abnormalities), teeth (yellowing of teeth and erosion of tooth enamel), kidneys, and behavior/central nervous system (muscle contraction or spasticity). Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated eye contact with vapor/mist can cause conjunctivitis.

Sensitization:
No information available

Mutagenic Effects:
Animal experiments showed mutagenic effects
Cytogenetic Analysis - chromosome aberration test (Chinese Hamster ovary): Genotoxic effects were observed

Carcinogenic effects:
Not considered carcinogenic

<table>
<thead>
<tr>
<th>Components</th>
<th>ACGIH - Carcinogens</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA HCS - Carcinogens</th>
<th>Australia - Prohibited Carcinogenic Substances</th>
<th>Australia - Notifiable Carcinogenic Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>A4 Not Classifiable as a Human Carcinogen</td>
<td>Group 3 - Monograph 54 [1992]</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>
Specific Target Organ Toxicity

STOT - single exposure  No information available
STOT - repeated exposure No information available
Target Organs: Skin, Eyes, Respiratory system.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects: Aquatic environment.

*Hydrogen chloride - 7647-01-0*

Freshwater Fish Species Data: 282 mg/L LC50 Gambusia affinis 96 h static 1

Persistence and degradability: No information available

Bioaccumulative potential: No information available

Mobility: No information available

13. DISPOSAL CONSIDERATIONS

Disposal Methods

Waste from residues / unused products:
Waste must be disposed of in accordance with Federal, State and Local regulation.

Contaminated packaging:
Empty containers should be taken for local recycling, recovery or waste disposal

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

14. TRANSPORT INFORMATION

DOT

UN-No: UN1789
Proper Shipping Name: Hydrochloric acid (Solution)
Hazard Class: 8
Subsidiary Risk: Not applicable
Packing Group: II
Marine Pollutant: No data available
ERG No: 157
DOT RQ (lbs): No information available
Symbol(s): R5

TDG (Canada)

UN-No: UN1789
Proper Shipping Name: Hydrochloric acid (Solution)
### 14. TRANSPORT INFORMATION

| Hazard Class: | 8 |
| Subsidiary Risk: | No information available |
| Packing Group: | II |
| Description: | No information available |

#### ADR

- **UN-No:** UN1789
- **Proper Shipping Name:** Hydrochloric acid (Solution)
- **Hazard Class:** 8
- **Packing Group:** II
- **Subsidiary Risk:** No information available
- **Classification Code:** No information available
- **Description:** No information available
- **CEFIC Tremcard No:** No information available

#### IMO / IMDG

- **UN-No:** UN1789
- **Proper Shipping Name:** Hydrochloric acid (Solution)
- **Hazard Class:** 8
- **Subsidiary Risk:** No information available
- **Packing Group:** II
- **Description:** No information available
- **IMDG Page:** No information available
- **Marine Pollutant:** No information available
- **EMS:** F-A
- **MFAG:** No information available
- **Maximum Quantity:** No information available

#### RID

- **UN-No:** UN1789
- **Proper Shipping Name:** Hydrochloric acid (Solution)
- **Hazard Class:** 8
- **Subsidiary Risk:** 8
- **Packing Group:** II
- **Classification Code:** No information available
- **Description:** No information available

#### ICAO

- **UN-No:** UN1789
- **Proper Shipping Name:** Hydrochloric acid (Solution)
- **Hazard Class:** 8
- **Subsidiary Risk:** No information available
- **Packing Group:** II
- **Description:** No information available

#### IATA

- **UN-No:** UN1789
- **Proper Shipping Name:** Hydrochloric acid (Solution)
- **Hazard Class:** 8
- **Subsidiary Risk:** No information available
- **Packing Group:** II
- **ERG Code:** 8L
- **Description:** No information available

### 15. REGULATORY INFORMATION

- **Product code:** HY106
- **Product name:** HYDROCHLORIC ACID, 37 PERCENT, FCC
## 15. REGULATORY INFORMATION

### International Inventories

<table>
<thead>
<tr>
<th>Components</th>
<th>U.S. TSCA</th>
<th>KOREA KECL</th>
<th>Philippines (PICCS)</th>
<th>Japan ENCS</th>
<th>CHINA</th>
<th>Australia (AICS)</th>
<th>EINECS-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Present</td>
<td>Present KE-35400</td>
<td>Present</td>
<td>Not present</td>
<td>Present</td>
<td>Present</td>
<td>Present 231-791-2</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>Present T</td>
<td>Present KE-20189</td>
<td>Present</td>
<td>Present (1)-215</td>
<td>Present</td>
<td>Present</td>
<td>Present 231-595-7</td>
</tr>
</tbody>
</table>

### U.S. Regulations

**Hydrogen chloride**
- **Massachusetts RTK**: Present
- **Massachusetts EHS**: extraordinarily hazardous
- **New Jersey RTK Hazardous Substance List**: Present
- **New Jersey (EHS) List**: Present
- **New Jersey TCPA - EHS**: 15000 lb TQ
  - 5600 lb TQ
  - 2000 lb TQ
- **Pennsylvania RTK**: Environmental hazard
- **Pennsylvania RTK - Environmental Hazard List**: Present
- **Michigan PSM HHC**: = 5000 lb TQ
- **Minnesota - Hazardous Substance List**: Present
- **New York Release Reporting - List of Hazardous Substances**:
  - 5000 lb RQ
  - 100 lb RQ
- **Louisiana Reportable Quantity List for Pollutants**: 5000 lb final RQs listed in 40 CFR 117.3 Table 117.3 and 40 CFR 302.4 Table 302.4
  - 2270 kg final RQs listed in 40 CFR 117.3 Table 117.3 and 40 CFR 302.4 Table 302.4
- **5000 lb RQs listed in Louisiana Administrative Code, Title 33, Part 1, Subpart 2, Chapter 39, Subchapter E. Applies to unauthorized emissions based on total mass emitted into or onto all media within any consecutive 24-hour period**
- **1000 lb RQs listed in Louisiana Administrative Code, Title 33, Part 1, Subpart 2, Chapter 39, Subchapter E. Applies to unauthorized emissions based on total mass emitted into the atmosphere**
- **California Directors List of Hazardous Substances**: Present
- **FDA - Food Additives Generally Recognized as Safe (GRAS)**: 21 CFR 182.1057

**California Prop. 65: Safe Drinking Water and Toxic Enforcement Act of 1986.**

**Chemicals Known to the State of California to Cause Cancer:**
This product does not contain a chemical requiring a warning under California Prop. 65. (See table below)

**Chemicals Known to the State of California to Cause Reproductive Toxicity:**
This product does not contain a chemical requiring a warning under California Prop. 65. (See table below)

<table>
<thead>
<tr>
<th>Components</th>
<th>Carcinogen</th>
<th>Developmental Toxicity</th>
<th>Male Reproductive Toxicity</th>
<th>Female Reproductive Toxicity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
<td>Not Listed</td>
</tr>
</tbody>
</table>

**CERCLA/SARA**

<table>
<thead>
<tr>
<th>Components</th>
<th>CERCLA - Hazardous Substances and their Reportable Quantities</th>
<th>Section 302 Extremely Hazardous Substances and TPQs</th>
<th>Section 302 Extremely Hazardous Substances and RQs</th>
<th>Section 313 - Chemical Category</th>
<th>Section 313 - Reporting de minimis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>5000 lb final RQ</td>
<td>5000 lb final RQ</td>
<td>2270 kg final RQ</td>
<td>None</td>
<td>1.0 % de minimis concentration</td>
</tr>
</tbody>
</table>

**U.S. TSCA**

<table>
<thead>
<tr>
<th>Components</th>
<th>TSCA Section 5(a)2 - Chemicals With Significant New Use Rules (SNURS)</th>
<th>TSCA 8(d) - Health and Safety Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
Components TSCA Section 5(a)2 - Chemicals With Significant New Use Rules (SNURS) TSCA 8(d) -Health and Safety Reporting
Hydrogen chloride Not Applicable Not Applicable

Canada

WHMIS hazard class:
D1A Very toxic materials
D1B Toxic materials
E Corrosive material

Water
Uncontrolled product according to WHMIS classification criteria

Hydrogen chloride
A D1A E
E 0.036% in aqueous solution, 0.36% in aqueous solution, 3.6% in aqueous solution
D1B E 28% in aqueous solution
D1A E 31.45% in aqueous solution, 35.2% in aqueous solution

Canada Controlled Products Regulation:
This product has been classified according to the hazard criteria of the CPR (Controlled Products Regulation) and the MSDS contains all of the information required by the CPR.

Components WHMIS Ingredient Disclosure List -
Hydrogen chloride 1 %

Inventory

Components Canada (DSL) Canada (NDSL)
Water Present Not Listed
Hydrogen chloride Present Not Listed

Components CEPA Schedule I - Toxic Substances CEPA - 2010 Greenhouse Gases Subject to Manditory Reporting
Water Not listed Not listed
Hydrogen chloride Not listed Not listed

EU Classification

R-phrase(s)
R34 - Causes burns.
R37 - Irritating to respiratory system.

S -phrase(s)
S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 1/2 - Keep locked up and out of the reach of children.

Components Classification Concentration Limits: Safety Phrases
Water Not listed No information

Product code: HY106 Product name: HYDROCHLORIC ACID, 37 PERCENT, FCC
### 15. OTHER INFORMATION

| Hydrogen chloride | Hydrogen Chloride: C;R35  
|                  | T;R23  
|                  | Hydrochloric Acid:  
|                  | + hydrochloric acid ... %  
|                  | C; R34  -  Xi; R37  
|                  | Concentration Limit(s):  
|                  | C >= 25 %  C; R34-37  
|                  | 10 % <= C < 25 %  Xi;  
|                  | R36/37/38  
|                  | 0.02%<=C<0.2%  
|                  | Xi;R36/37/38  
|                  | 0.2%<=C<0.5%  C;R34  
|                  | 0.5%<=C<1%  C;R20-34  
|                  | 1%<=C<5%  C;R20-35  
|                  | 5%<=C  T;C;R23-35  
|                  | Hydrogen Chloride:  
|                  | S(1/2)-S9-S26-S36/37/39-S45  
|                  | Hydrochloric Acid:  
|                  | S(1/2)-S26-S45  
|                  | The product is classified in accordance with Annex VI to Directive 67/548/EEC  
|                  | Indication of danger:  
|                  | C - Corrosive.  
|                  | Xi - Irritant.  

**Product code:** HY106  
**Product name:** HYDROCHLORIC ACID, 37 PERCENT, FCC
### Dis­claimer:

All che­mi­cals may pose un­known haz­ards and should be used with cau­tion. This Safe­ty Data Sheet (SDS) ap­plies only to the mat­ter­ial as pack­aged. If this pro­duct is com­bined with oth­er mat­erials, de­terior­ates, or be­comes con­tam­i­nated, it may pose haz­ards not men­tioned in this SDS. The phys­i­cal prop­er­ties re­ported in this SDS are ob­tained from the lit­er­a­ture and do not con­sti­tute product spec­i­fic­a­tions. Infor­ma­tion con­tained here­in does not con­sti­tute a war­ranty, whether ex­pressed or im­plied, as to the safety, mer­chant­a­bil­i­ty or fit­ness of the goods for a par­tic­u­lar pur­pose. Spe­c­trum Che­mi­cals & Lab­o­ra­tory Prod­ucts, Inc. as­sumes no re­spon­sibility for re­sults ob­tained or for in­cen­tial or con­se­cu­tive dam­ages, in­clud­ing lost profits, aris­ing from the use of these data. No war­ranty against in­fringe­ment of any pat­ent, copy­right or trademark is made or im­plied. It shall be the user’s res­pon­sibil­i­ty to de­velop pro­per meth­ods of hand­ling and per­sonal pro­tec­tion based on the actual con­di­tions of use. While this SDS is based on tech­ni­cal data judg­ed to be re­li­able, Spe­c­trum as­sumes no re­spon­sibility for the com­pleteness or ac­cur­acy of the in­for­ma­tion con­tained here­in.

---

**Product code:** HY106  
**Product name:** HYDROCHLORIC ACID, 37 PERCENT, FCC
Manufacturer

Product Covered: HY106, Hydrochloric Acid, 37 Percent, FCC

Spectrum takes ownership as the manufacturer for the Spectrum product listed above and provides full quality assurance, customer service, and technical product support.

While information concerning the raw material manufacturer of our starting materials is considered proprietary, such information can be made available upon request contingent on demonstration of business volume justification and successful execution of confidential disclosure agreement (CDA).

Requests for disclosure of proprietary raw material manufacturer information may be submitted to the assigned account representative for consideration.

Sincerely,

Alan Wang, MSQA, ASQ CQA
Senior Manager of Technical Services
techservices@spectrumchemical.com

Certificate of Registration

Intertek

This is to certify that the quality management system of

Spectrum Chemicals and Laboratory Products, Inc.
Main Site: 14422 South San Pedro Street, Gardena, California, 90248, USA
Additional Sites: 13915 South Main Street, Los Angeles, California, 90061, USA
755 Jersey Avenue, New Brunswick, New Jersey, 08901, USA
769 Jersey Avenue, New Brunswick, New Jersey, 08901, USA
7400 North Oracle Road, Suite 221, Tucson, Arizona, 85704, USA

has been assessed and registered by Intertek as conforming to the requirements of

ISO 9001:2008

The quality management system is applicable to

California and New Jersey sites: The manufacture and distribution of specialty fine chemicals, solutions, equipment, supplies and products for the laboratory, pharmaceutical, food, healthcare, cosmetic, fragrance, biotechnology, environmental and process industries.

Arizona site: Supporting Spectrum’s two manufacturing facilities by: selecting and qualifying distributors of Laboratory and Safety Equipment; processing bids and quotes to generate new sales opportunities; sourcing bulk chemicals in support of bulk bids and quotes; assisting production operations through order expediting and IT infrastructure support.

Certificate Number: 94-316m-01
Initial Certification Date: 27 December 1994
Certificate Issue Date: 29 January 2016
Certificate Expiry Date: 14 September 2018

Calin Moldovean, President
Intertek Testing Services NA, Inc.
900 Chelmsford Street, Suite 301-3, Lowell, MA, USA

In the issuance of this certificate, Intertek assumes no liability to any party other than to the Client, and then only in accordance with the agreed upon Certification Agreement. This certificate’s validity is subject to the organization maintaining their system in accordance with Intertek’s requirements for systems certification. Validity may be confirmed via email at certificate.validation@intertek.com or by scanning the code to the right with a smartphone.

The certificate remains the property of Intertek, to whom it must be returned upon request.

CT-ISO 9001-2008-ANAB-EN-LT-L-26.jun.15
Certificate of Registration

This is to certify that the quality management system of

Spectrum China Ltd.

Building A20, No. 3802, Shengang Road, Songjiang District, Shanghai, China

has been assessed and registered by Intertek as conforming to the requirements of

ISO 9001: 2008

The quality management system is applicable to:

Provision of service of purchase, testing and sales for chemical products, repacking of non-hazardous chemical products.

Organization Code: 77762704-8
Certificate Number: 111310001-01
Certificate Issue Date: 17 November 2015
Certificate Expiry Date: 14 September 2018

Authorised Signature: Calin Moldovean – President, Business Assurance
Intertek Certification Limited, 10A Victory Park, Victory Road, Derby DE24 8ZF, United Kingdom

Intertek Certification Limited is a UKAS accredited body under schedule of accreditation no. 014.

In the issuance of this certificate, Intertek assumes no liability to any party other than to the client, and then only in accordance with the agreed upon Certification Agreement. This certificate's validity is subject to the organization maintaining their system in accordance with Intertek’s requirements for systems certification. Validity may be confirmed via email at certificate.validation@intertek.com or by scanning the code to the right with a smartphone.
The annual validity of the certificate can also be checked through the website http://www.cnca.gov.cn of CNCA in China.

The certificate remains the property of Intertek, to whom it must be returned upon request.
March 28, 2016

Certificate of cGMP

Dear Valued Customer:

Spectrum Chemicals and Laboratory Products certify that our USP, NF, FCC, EP, BP, JP, and food grade products are produced, processed, packaged and held in compliance with current Good Manufacturing Practices (cGMP) in accordance with the applicable parts of 21 CFR, parts 210 and 211 of the Code of Federal Regulations.

Spectrum is an FDA registered and inspected drug establishment. Our United States Food and Drug Administration (USFDA) Registration numbers are as follows:

Spectrum - Gardena, CA: 2020632
Spectrum - New Brunswick, NJ: 2246824
Spectrum - Shanghai, China: 3006174778

Thank you for your interest with Spectrum products. Please feel free to contact the Quality Assurance department at 310-516-8000 or via email at qualityassurance@spectrumchemical.com if we may be of further assistance.

Sincerely,

Michelle Weston
Quality Assurance Specialist
April 13, 2016

Certificate of cGMP

Dear Valued Customer:

Spectrum Chemicals and Laboratory Products certify that the following product(s) is produced, processed, packaged and held in compliance with current Good Manufacturing Practices (cGMP) in accordance with the applicable parts of 21 CFR, parts 210 and 211 of the Code of Federal Regulations.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Product Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>HY106</td>
<td>Hydrochloric Acid, 37 Percent, FCC</td>
</tr>
</tbody>
</table>

Spectrum is an FDA registered and inspected drug establishment. Our United States Food and Drug Administration (USFDA) Registration numbers are as follows:

- Spectrum-Gardena, CA: 2020632
- Spectrum-New Brunswick, NJ: 2246824
- Spectrum-Shanghai, China: 3006174778

Thank you for your interest with Spectrum products. Please feel free to contact the Quality Assurance department at 310-516-8000 or via email at qualityassurance@spectrumchemical.com if we may be of further assistance.

Sincerely,

[Signature]

Michelle Weston
Quality Assurance Specialist
April 27, 2016

Re: Hydrochloric Acid, 37 Percent, FCC- HY106

To Whom It May Concern:

Thank you for your interest in Spectrum high quality chemicals.

We at Spectrum Chemical Mfr. Corp. understand the concern regarding Bovine Spongiform Encephalopathy (BSE). Please be assured that the chemical Hydrochloric Acid, 37 Percent, FCC- HY106 is BSE/TSE free.

If you have any further questions, please contact Tech Services at (310) 516-8000 Extension 5471, or by email at techservices@spectrumchemical.com.

Sincerely,

Darlene Dagdag-Lyudmirskiy
Technical Services
Spectrum Chemical Mfr. Corp.

This document has been produced electronically and is valid without a signature
April 27, 2016

Re: Hydrochloric Acid, 37 Percent, FCC- HY106

To Whom It May Concern:

Thank you for your interest in Spectrum high quality chemicals.

We at Spectrum Chemical Mfr. Corp. understand the concern regarding the presence of allergens in raw materials. Please be assured that the following chemical does not contain (Milk; Egg; Fish; Shellfish; Sulfur dioxide and sulfites at concentrations of more than 10 mg/kg or 10 mg/liter expressed as SO2; Lupin; Tree nuts; Mollusks; Wheat; Peanuts; Soy; Cereals containing Gluten; Celery; Mustard; Sesame Seed).

Hydrochloric Acid, 37 Percent, FCC- HY106

If you have any further questions, please contact Tech Services at (310) 516-8000 Extension 5471, or by email at techservices@spectrumchemical.com.

Sincerely,

Darlene Dagdag-Lyudmirskiy
Technical Services
Spectrum Chemical Mfr. Corp.

This document has been produced electronically and is valid without a signature.
May 5, 2016

Re: Hydrochloric Acid, 37 Percent, FCC-HY106

To Whom It May Concern:

Thank you for your interest in Spectrum high quality chemicals.

We at Spectrum Chemical Mfg. Corp. understand the concern regarding Aflatoxins in raw materials. To the best of our knowledge, the product listed below is not contaminated with Aflatoxins. Aflatoxins are not used in production. The following product does not come in contact with Aflatoxins at any stage of production.

Hydrochloric Acid, 37 Percent, FCC-HY106

If you have any further questions, please contact Tech Services at (310) 516-8000 Extension 5471, or by email at techservices@spectrumchemical.com.

Sincerely,

Darlene Dagdag-Lyudmirskiy
Technical Services
Spectrum Chemical Mfr. Corp.

This document has been produced electronically and is valid without a signature
The Spectrum label presents technical and safety information in an easily understood format. Our technical specialists stay abreast of the latest requirements of the Globally Harmonized System for Classification and Labelling of Chemicals (GHS), as well as the Occupational Safety and Health Administration (OSHA), the Food and Drug Administration (FDA) and other government regulatory agencies in order to ensure compliance, accuracy and concise hazard communication.

**Storage Color Band**

This color-coded band indicates the hazard most likely to be posed by that material under storage conditions. The criteria used to assign band colors have been established by the Storage Code working group of the Society for Chemical Hazard Communication (SCHC). It is recommended that like colors be stored together, unless otherwise stated, based on the color codes indicated to the right. However, it is the responsibility of the customer to check with their local fire department for possible conflicts with our recommendations when storing hazardous chemicals.
# Certificate Of Analysis

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Lot Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>HY106</td>
<td>1FA0061</td>
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<table>
<thead>
<tr>
<th>Item</th>
<th>Item Number</th>
<th>CAS Number</th>
<th>Molecular Formula</th>
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</thead>
<tbody>
<tr>
<td>Hydrochloric Acid, 37 Percent, FCC</td>
<td>HY106</td>
<td>7647-01-0</td>
<td>HCl</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test</th>
<th>Specification</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSAY</td>
<td>36.0 - 38.0 %</td>
<td>36.80 %</td>
</tr>
<tr>
<td>COLOR</td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY</td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td>IRON (Fe)</td>
<td>5 mg/kg</td>
<td>&lt; 0.2 mg/kg</td>
</tr>
<tr>
<td>LEAD (Pb)</td>
<td>1 mg/kg</td>
<td>&lt; 1 mg/kg</td>
</tr>
<tr>
<td>MERCURY</td>
<td>0.10 mg/kg</td>
<td>&lt; 0.10 mg/kg</td>
</tr>
<tr>
<td>NONVOLATILE RESIDUE</td>
<td>0.5 %</td>
<td>&lt; 0.5 %</td>
</tr>
<tr>
<td>ORGANIC COMPOUNDS</td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td>OXIDIZING SUBSTANCES (as Cl₂)</td>
<td>0.003 %</td>
<td>&lt; 0.003 %</td>
</tr>
<tr>
<td>REDUCING SUBSTANCES (as SO₃)</td>
<td>0.007 %</td>
<td>&lt; 0.0001 %</td>
</tr>
<tr>
<td>SULFATE</td>
<td>0.5 %</td>
<td>&lt; 0.0001 %</td>
</tr>
<tr>
<td>IDENTIFICATION</td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td>EXPIRATION DATE</td>
<td>01-DEC-2020</td>
<td></td>
</tr>
<tr>
<td>DATE OF MANUFACTURE</td>
<td>01-DEC-2015</td>
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<tr>
<td>APPEARANCE</td>
<td>CLEAR COLORLESS LIQUID</td>
<td></td>
</tr>
</tbody>
</table>

Spectrum Chemical Mfg Corp  
14422 South San Pedro Street  
Gardena 90248 CA

Certificate of Analysis Results Certified By:  
[Signature]  
Adan Hernandez  
Quality Control Manager  
Spectrum Chemicals & Laboratory Products

All pharmaceutical ingredients are tested using current edition of applicable pharmacopeia.
<table>
<thead>
<tr>
<th>Test</th>
<th>Specification</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASSAY</strong></td>
<td>36.0 - 38.0 %</td>
<td>36.7 %</td>
</tr>
<tr>
<td><strong>COLOR</strong></td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td><strong>SPECIFIC GRAVITY</strong></td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td><strong>IRON (Fe)</strong></td>
<td>5 mg/kg</td>
<td>&lt;0.2 mg/kg</td>
</tr>
<tr>
<td><strong>LEAD (Pb)</strong></td>
<td>1 mg/kg</td>
<td>&lt;1 mg/kg</td>
</tr>
<tr>
<td><strong>MERCURY</strong></td>
<td>0.10 mg/kg</td>
<td>&lt;0.10 mg/kg</td>
</tr>
<tr>
<td><strong>NONVOLATILE RESIDUE</strong></td>
<td>0.5 %</td>
<td>&lt;0.5 %</td>
</tr>
<tr>
<td><strong>ORGANIC COMPOUNDS</strong></td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td><strong>OXIDIZING SUBSTANCES (as Cl2)</strong></td>
<td>0.003 %</td>
<td>&lt;0.003 %</td>
</tr>
<tr>
<td><strong>REDUCING SUBSTANCES (as SO4)</strong></td>
<td>0.007 %</td>
<td>&lt;0.0001 %</td>
</tr>
<tr>
<td><strong>SULFATE</strong></td>
<td>0.5 %</td>
<td>&lt;0.5 %</td>
</tr>
<tr>
<td><strong>IDENTIFICATION</strong></td>
<td>TO PASS TEST</td>
<td>PASSES TEST</td>
</tr>
<tr>
<td><strong>EXPIRATION DATE</strong></td>
<td></td>
<td>05-OCT-2020</td>
</tr>
<tr>
<td><strong>DATE OF MANUFACTURE</strong></td>
<td></td>
<td>05-OCT-2015</td>
</tr>
<tr>
<td><strong>APPEARANCE</strong></td>
<td></td>
<td>CLEAR COLORLESS LIQUID</td>
</tr>
</tbody>
</table>

Spectrum Chemical Mfg Corp
755 Jersey Avenue
New Brunswick 08901 NJ

Certificate of Analysis Results Certified By:

Mulbah F. Dwanah
Laboratory Supervisor
Spectrum Chemicals & Laboratory Products

All pharmaceutical ingredients are tested using current edition of applicable pharmacopeia.
January 26, 2016

**RE: Lot Numbering System**

Dear Valued Customer:

This letter is to inform you of Spectrum Chemicals and Laboratory Products’ Lot Numbering System. The system is based on an alpha-numerical sequence which provides the month, year and location of production.

The lot numbering system utilized until 2010 is a sequence of six characters, two letters followed by four numbers. The first letter represents the year, for example, Y denotes 2009 and Z denotes 2010. The second letter represents the month and site, for example, A-L denotes January through December at Spectrum’s Gardena, CA facility, while M-X denotes January through December at the New Brunswick, NJ facility. The following four numbers are sequentially assigned.

**Example:** ZI0928 = The 928th material produced in California in September 2010

The lot numbering system utilized for 2011 and forward, is a sequence of seven characters. The first character, a number, represents the production facility:

1 = Gardena, CA Facility
2 = New Brunswick, NJ Facility
3 = China Facility

The second character, a letter, represents the year. For example, A denotes 2011 and B denotes 2012. The third character, a letter, represents the month, with A denoting January and L denoting December. The following four numbers are sequentially assigned.

**Example:** 2AA0706 = The 706th material produced in New Jersey in January 2011

Thank you for your interest with Spectrum products. Please feel free to contact us at 310-516-8000 or via email at qualityassurance@spectrumchemical.com if we may be of further assistance.

Sincerely,

Michael Dang
Manager, GMP Compliance
Stability – Shelf Life Guidance

Product Covered: HY106, Hydrochloric Acid, 37 Percent, FCC

Spectrum Chemical’s manufacturing partner has assigned the following shelf life guidance for the product listed above.

The product, HY106, Hydrochloric Acid, 37 Percent, FCC, is assigned a 60 months shelf life from date of manufacturing. The quality and integrity of the chemical depends on the handling and storage conditions. Please refer to the Safety Data Sheet for proper storage and handling procedures.

Adan R. Hernandez
Quality Control Manager

Corporate Headquarters
769 Jersey Avenue
New Brunswick, NJ 08901-3605