Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Hydrochloric acid

Cat No.: A142-212; A142P-19; A142P-20; A144-212; A144-212LC; A144-500; A144-500LB; A144-500LC; A144-612GAL; A144C-212; A144C-212EA; A144P-19; A144P-20; A144S-212; A144S-212EA; A144S-500; A144SI-212; A466-1; A466-2; A466-2LC; A466-250; A466-500; A481-212; A481-212LC; A508-4; A508-212; A508-212LC; A508-500; A508SK-212; S71942SC; S71943; S71943ND; S80038; SA49

Synonyms: Muriatic acid; Hydrogen chloride; HCl (Technical/Certified ACS Plus/Optima/NF/FCC/Trace Metal Grade)

Recommended Use: Laboratory chemicals

Company: Fisher Scientific
Address: One Reagent Lane
City: Fair Lawn, NJ
Postal Code: 07410
Telephone: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 703-527-3887

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview
Causes burns by all exposure routes. May be harmful if inhaled.

Appearance: Colorless
Physical State: Liquid
Odor: Pungent

Target Organs: Skin, Respiratory system, Eyes, Gastrointestinal tract (GI), Liver, Kidney, Teeth

Potential Health Effects

Acute Effects

Principle Routes of Exposure

<table>
<thead>
<tr>
<th>Route</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes</td>
<td>Causes burns.</td>
</tr>
<tr>
<td>Skin</td>
<td>Causes burns. May be harmful in contact with skin.</td>
</tr>
<tr>
<td>Inhalation</td>
<td>Causes burns. May be harmful if inhaled.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Causes burns. May be harmful if swallowed.</td>
</tr>
</tbody>
</table>

Page 1 / 8
Chronic Effects

Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse liver effects. May cause adverse kidney effects. Chronic exposure to corrosive fumes/gases may cause erosion of the teeth followed by jaw necrosis. Bronchial irritation with chronic cough and frequent attacks of pneumonia are common. Gastrointestinal disturbances may also be seen.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions

Preexisting eye disorders. Skin disorders.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>62-65</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>7647-01-0</td>
<td>35-38</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Eye Contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact

Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation

Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.

Ingestion

Do not induce vomiting. Call a physician or Poison Control Center immediately.

Notes to Physician

Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flash Point

Method: No information available.

No information available.

Autoignition Temperature

No information available.

Explosion Limits

Upper: No data available

Lower: No data available

Suitable Extinguishing Media

Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

Unsuitable Extinguishing Media

No information available.

Hazardous Combustion Products

No information available.

Sensitivity to mechanical impact

No information available.

Sensitivity to static discharge

No information available.

Specific Hazards Arising from the Chemical

Corrosive Material. Causes burns by all exposure routes. Thermal decomposition can lead to release of irritating gases and vapors.
Protective Equipment and Precautions 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
Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Do not get in eyes, on skin, or on clothing.

Environmental Precautions
Should not be released into the environment.

Methods for Containment and Clean Up
Soak up with inert absorbent material. Keep in suitable and closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Use only under a chemical fume hood. Wear personal protective equipment. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Do not ingest.

Storage
Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Measures
Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>Ceiling: 2 ppm</td>
<td>Ceiling: 7 mg/m³</td>
<td>IDLH: 50 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ceiling: 5 ppm</td>
<td>Ceiling: 5 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Vacated) Ceiling: 5 ppm</td>
<td>Ceiling: 7 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Vacated) Ceiling: 7 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Quebec</th>
<th>Mexico OEL (TWA)</th>
<th>Ontario TWAEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>Ceiling: 7.5 mg/m³</td>
<td>Peak: 7 mg/m³</td>
<td>CEV: 2 ppm</td>
</tr>
<tr>
<td></td>
<td>Ceiling: 5 ppm</td>
<td>Peak: 5 ppm</td>
<td></td>
</tr>
</tbody>
</table>

NIOSH IDLH: Immediately Dangerous to Life or Health

Personal Protective Equipment

| Eye/face Protection | Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166 |
| Skin and body protection | Wear appropriate protective gloves and clothing to prevent skin exposure |
| Respiratory Protection | Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced |
9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Colorless</td>
</tr>
<tr>
<td>odor</td>
<td>pungent</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No information available.</td>
</tr>
<tr>
<td>pH</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>125 mbar @ 20 °C</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>1.27 (Air = 1.0)</td>
</tr>
<tr>
<td>Viscosity</td>
<td>1.8 mPa.s @ 15°C</td>
</tr>
<tr>
<td>Boiling Point/Range</td>
<td>57°C / 135°F @ 760 mmHg</td>
</tr>
<tr>
<td>Melting Point/Range</td>
<td>-35°C / -31°F</td>
</tr>
<tr>
<td>Decomposition temperature °C</td>
<td>No information available.</td>
</tr>
<tr>
<td>Flash Point</td>
<td>No information available.</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>No information available.</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.18</td>
</tr>
<tr>
<td>Solubility</td>
<td>Soluble in water</td>
</tr>
<tr>
<td>log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>55.55</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>HCl.H2O</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Stability

Stable under normal conditions.

Conditions to Avoid

Incompatible products. Excess heat.

Incompatible Materials

Strong oxidizing agents, Reducing agents, Bases, Metals

Hazardous Decomposition Products

Carbon monoxide (CO), Carbon dioxide (CO₂), Hydrogen chloride gas

Hazardous Polymerization

Hazardous polymerization does not occur.

Hazardous Reactions

None under normal processing.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Component Information

<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>90 mL/kg (Rat)</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>700 mg/kg (Rat)</td>
<td>5010 mg/kg (Rabbit)</td>
<td>3124 ppm (Rat) 1 h</td>
</tr>
</tbody>
</table>

Irritation

Causes burns by all exposure routes

Toxicologically Synergistic Products

No information available.
Chronic Toxicity

Carcinogenicity
The table below indicates whether each agency has listed any ingredient as a carcinogen.

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>Not listed</td>
<td>group 3</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

IARC: (International Agency for Research on Cancer)
- Group 1 - Carcinogenic to Humans
- Group 2A - Probably Carcinogenic to Humans
- Group 2B - Possibly Carcinogenic to Humans

Sensitization
No information available.

Mutagenic Effects
Mutagenic effects have occurred in experimental animals.

Reproductive Effects
Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects
Developmental effects have occurred in experimental animals.

Teratogenicity
Teratogenic effects have occurred in experimental animals.

Other Adverse Effects
See actual entry in RTECS for complete information.

Endocrine Disruptor Information
No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity
Do not empty into drains.

Persistence and Degradability
No information available

Bioaccumulation/ Accumulation
No information available

Mobility
No information available

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. TRANSPORT INFORMATION

DOT
UN-No: UN1789
Proper Shipping Name: HYDROCHLORIC ACID
14. TRANSPORT INFORMATION

Hazard Class 8
Packing Group II

TDG

UN-No UN1789
Proper Shipping Name HYDROCHLORIC ACID
Hazard Class 8
Packing Group II

IATA

UN-No UN1789
Proper Shipping Name Hydrochloric acid
Hazard Class 8
Packing Group II

IMDG/IMO

UN-No UN1789
Proper Shipping Name Hydrochloric acid
Hazard Class 8
Packing Group II

15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>PICCS</th>
<th>ENCS</th>
<th>AICS</th>
<th>CHINA</th>
<th>KECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>231-791-2</td>
<td></td>
<td>X</td>
<td>-</td>
<td></td>
<td>X</td>
<td></td>
<td>KE-35400</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>T</td>
<td>X</td>
<td>-</td>
<td>231-595-7</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>KE-20189</td>
</tr>
</tbody>
</table>

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.
U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>7647-01-0</td>
<td>35-38</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazardous Categorization

Acute Health Hazard            No
Chronic Health Hazard          No
Fire Hazard                    No
Sudden Release of Pressure Hazard No
Reactive Hazard                No

Clean Water Act

<table>
<thead>
<tr>
<th>Component</th>
<th>CWA - Hazardous Substances</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>X</td>
<td>5000 lb</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Clean Air Act

<table>
<thead>
<tr>
<th>Component</th>
<th>HAPS Data</th>
<th>Class 1 Ozone Depletors</th>
<th>Class 2 Ozone Depletors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OSHA

<table>
<thead>
<tr>
<th>Component</th>
<th>Specifically Regulated Chemicals</th>
<th>Highly Hazardous Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>-</td>
<td>TQ: 5000 lb</td>
</tr>
</tbody>
</table>

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

<table>
<thead>
<tr>
<th>Component</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA EHS RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>5000 lb</td>
<td>5000 lb</td>
</tr>
</tbody>
</table>

California Proposition 65

This product does not contain any Proposition 65 chemicals.

State Right-to-Know

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant        N
DOT Severe Marine Pollutant N
U.S. Department of Homeland Security
This product contains the following DHS chemicals:

<table>
<thead>
<tr>
<th>Component</th>
<th>DHS Chemical Facility Anti-Terrorism Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen chloride</td>
<td>0 lb STQ (anhydrous); 11250 lb STQ (37% concentration or greater)</td>
</tr>
</tbody>
</table>

Other International Regulations

Mexico - Grade
No information available

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
D1A Very toxic materials
E Corrosive material

16. OTHER INFORMATION

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Tel: (412) 490-8929

Creation Date
24-Aug-2009

Print Date
23-Sep-2009

Revision Summary
“***”, and red text indicates revision

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS