



Certificate of Analysis

Product Number: S010401
Product Description: Hydrochloric acid
Product Grade: Instrument Quality
Lot Number: 4117120
Release Date: 12/22/2017 (mm/dd/yyyy)
Expiration Date: 12/22/2020 (mm/dd/yyyy)

CAS Number: 7647-01-0
Molecular Weight: 36.46
Molecular Formula: HCl
Density: 1.18 g/mL
Molarity: 12 moles/litre
Normality: 12 moles/litre

Analytical Data

| Analyte | Specification | Actual Value | Analyte | Specification | Actual Value |
|----------------------------------|---------------|--------------|-------------------|------------------|--------------|
| Assay (HCl) | 34 - 37% w/w | 36% w/w | Manganese (Mn) | 0.1 ppb | < 0.1 ppb |
| Colour | 10 APHA | < 7 APHA | Mercury (Hg) | 0.1 ppb | < 0.02 ppb |
| Bromide (Br ⁻) | 10 ppm | < 10 ppm | Molybdenum (Mo) | 0.1 ppb | < 0.1 ppb |
| Free Chlorine (Cl ₂) | 0.5 ppm | < 0.5 ppm | Neodymium (Nd) | 0.1 ppb | < 0.1 ppb |
| Total Phosphorus (P) | 0.01 ppm | < 0.01 ppm | Nickel (Ni) | 0.5 ppb | < 0.1 ppb |
| Total Sulphur (S) | 0.3 ppm | < 0.3 ppm | Niobium (Nb) | 0.1 ppb | < 0.1 ppb |
| Aluminum (Al) | 1 ppb | < 0.5 ppb | Palladium (Pd) | Information Only | < 0.5 ppb |
| Antimony (Sb) | 0.5 ppb | < 0.1 ppb | Platinum (Pt) | Information Only | < 0.5 ppb |
| Arsenic (As) | 0.5 ppb | < 0.1 ppb | Potassium (K) | 1 ppb | < 0.1 ppb |
| Barium (Ba) | 0.1 ppb | < 0.1 ppb | Praseodymium (Pr) | 0.1 ppb | < 0.1 ppb |
| Beryllium (Be) | 0.1 ppb | < 0.1 ppb | Rhenium (Re) | 0.1 ppb | < 0.1 ppb |
| Bismuth (Bi) | 0.1 ppb | < 0.1 ppb | Rhodium (Rh) | 0.1 ppb | < 0.1 ppb |
| Boron (B) | 1 ppb | < 0.5 ppb | Rubidium (Rb) | 0.1 ppb | < 0.1 ppb |
| Cadmium (Cd) | 0.1 ppb | < 0.1 ppb | Ruthenium (Ru) | 0.1 ppb | < 0.1 ppb |
| Calcium (Ca) | 1 ppb | < 0.5 ppb | Samarium (Sm) | 0.1 ppb | < 0.1 ppb |
| Cerium (Ce) | 0.1 ppb | < 0.1 ppb | Scandium (Sc) | 0.1 ppb | < 0.1 ppb |
| Cesium (Cs) | 0.1 ppb | < 0.1 ppb | Selenium (Se) | 1 ppb | < 0.1 ppb |
| Chromium (Cr) | 0.5 ppb | < 0.1 ppb | Silver (Ag) | 1 ppb | < 0.1 ppb |
| Cobalt (Co) | 0.1 ppb | < 0.1 ppb | Sodium (Na) | 1 ppb | < 0.5 ppb |
| Copper (Cu) | 0.5 ppb | < 0.2 ppb | Strontium (Sr) | 0.1 ppb | < 0.1 ppb |
| Dysprosium (Dy) | 0.1 ppb | < 0.1 ppb | Tantalum (Ta) | Information Only | < 1 ppb |
| Erbium (Er) | 0.1 ppb | < 0.1 ppb | Tellurium (Te) | 0.1 ppb | < 0.1 ppb |
| Europium (Eu) | 0.1 ppb | < 0.1 ppb | Terbium (Tb) | 0.1 ppb | < 0.1 ppb |
| Gadolinium (Gd) | 0.1 ppb | < 0.1 ppb | Thallium (Tl) | 0.1 ppb | < 0.1 ppb |
| Gallium (Ga) | 0.1 ppb | < 0.1 ppb | Thorium (Th) | 0.1 ppb | < 0.1 ppb |
| Gold (Au) | 0.5 ppb | < 0.1 ppb | Thulium (Tm) | 0.1 ppb | < 0.1 ppb |
| Hafnium (Hf) | 0.1 ppb | < 0.1 ppb | Tin (Sn) | 0.5 ppb | < 0.1 ppb |
| Holmium (Ho) | 0.1 ppb | < 0.1 ppb | Titanium (Ti) | 0.5 ppb | < 0.1 ppb |
| Indium (In) | 0.1 ppb | < 0.1 ppb | Tungsten (W) | 0.1 ppb | < 0.1 ppb |
| Iron (Fe) | 1 ppb | < 0.5 ppb | Uranium (U) | 0.1 ppb | < 0.1 ppb |
| Lanthanum (La) | 0.1 ppb | < 0.1 ppb | Vanadium (V) | 0.5 ppb | < 0.1 ppb |
| Lead (Pb) | 0.1 ppb | < 0.1 ppb | Ytterbium (Yb) | 0.1 ppb | < 0.1 ppb |
| Lithium (Li) | 0.1 ppb | < 0.1 ppb | Yttrium (Y) | 0.1 ppb | < 0.1 ppb |
| Lutetium (Lu) | 0.1 ppb | < 0.1 ppb | Zinc (Zn) | 1 ppb | < 0.5 ppb |
| Magnesium (Mg) | 0.5 ppb | < 0.5 ppb | Zirconium (Zr) | 0.1 ppb | < 0.1 ppb |

Greg Henson
QA & RA Manager

For terms and conditions of use, please see page 2.



Terms and Conditions of Use

Safety Guidelines:

PRIOR to opening or storing this product be sure to consult the Safety Data Sheet (SDS) to ensure safe storage and handling with regards to this hazardous material. This information must be read and understood prior to use or storage.

SAFETY HANDLING NOTES: Consult the SDS PRIOR to handling this product. Use proper safety apparel according to the recommendations of the SDS. Exposure controls and personal protection should include: a properly functioning fume hood, protection for eyes (safety glasses), hands (chemically compatible gloves), feet (chemically compatible boots), and exposed skin (splash protection and a chemically compatible apron). All of these items must conform to local/regional/national regulatory requirements.

SEASTAR™'s Product Integrity Guidelines:

We have found our products, unopened and sealed, maintain the certified integrity, or product quality, for their stated certification period under the following conditions:

- Store at room temperature, maximum range 15°C (59°F) to 25°C (77°F).
- Avoid exposure to sunlight or ultraviolet light sources.
- Open in a 'particle free' environment. SEASTAR recommends a HEPA or ULPA particle filtered trace metal clean room. Open product should be handled under Class 100 or ISO 5 clean room or better conditions.

Once opened, product integrity will depend on proper handling and exposure to contaminants. To reduce trace metal contamination, the inner pack of plastic bags and bottle should be opened under Class 100 or ISO 5 clean room or better conditions to maintain the integrity of the product. The use of plastic gloves, hair net and a clean room suit is also advised.

For SEASTAR™'s Product Expiration Policy and Product Permeation FAQ, please see our website.

Notes:

Reported density, molarity and normality values reflect published literature and are characteristic of the product's assay range. If you require an accurate density, molarity, or normality for the product that you have purchased, you will have to perform the measurement. Bottles within a given lot have small assay variations.

Definitions:

- **Actual value:** the measured value in a particular lot analysis.
- **Analyte:** the substance being measured.
- **Specification:** the maximum certified value of an analyte, unless otherwise specified.
- **Unit(s):** **ppm** – part per million or µg (microgram) of analyte per gram of solution.
ppb – part per billion or ng (nanogram) of analyte per gram of solution.
ppt – part per trillion or pg (picogram) of analyte per gram of solution.

A handwritten signature in black ink, appearing to read "Greg Henson", is positioned above a horizontal line.

Greg Henson
QA & RA Manager