SEASTAR CHEMICALS

Certificate of Analysis

Product Number:	**S020201**	**CAS Number:**	7601-90-3
Product Description:	Perchloric acid	**Molecular Weight:**	100.46
Product Grade:	**BASELINE**	**Molecular Formula:**	$HClO_4$
Lot Number:	2219030	**Density:**	1.67 g/mL
Release Date:	05/31/2019 (mm/dd/yyyy)	**Molarity:**	12 moles/litre
Expiration Date:	05/31/2022 (mm/dd/yyyy)	**Normality:**	12 moles/litre

Analytical Data

Analyte	Specification	Actual Value	Analyte	Specification	Actual Value
Assay ($HClO_4$)	65 - 71% w/w	67% w/w	Neodymium (Nd)	10 ppt	< 0.01 ppt
Aluminum (Al)	100 ppt	< 20 ppt	Nickel (Ni)	100 ppt	< 20 ppt
Antimony (Sb)	100 ppt	< 1 ppt	Niobium (Nb)	Information Only	< 0.5 ppt
Arsenic (As)	100 ppt	< 100 ppt	Palladium (Pd)	10 ppt	< 1 ppt
Barium (Ba)	100 ppt	< 1 ppt	Platinum (Pt)	100 ppt	< 1 ppt
Beryllium (Be)	100 ppt	< 0.05 ppt	Potassium (K)	100 ppt	< 10 ppt
Bismuth (Bi)	10 ppt	< 0.05 ppt	Praseodymium (Pr)	10 ppt	< 0.01 ppt
Cadmium (Cd)	10 ppt	< 0.5 ppt	Rhodium (Rh)	10 ppt	< 0.1 ppt
Calcium (Ca)	100 ppt	< 50 ppt	Rubidium (Rb)	10 ppt	< 0.2 ppt
Cerium (Ce)	10 ppt	< 0.1 ppt	Samarium (Sm)	10 ppt	< 0.01 ppt
Cesium (Cs)	10 ppt	< 0.1 ppt	Scandium (Sc)	100 ppt	< 0.01 ppt
Cobalt (Co)	100 ppt	< 1 ppt	Silver (Ag)	100 ppt	< 0.5 ppt
Copper (Cu)	100 ppt	< 1 ppt	Sodium (Na)	100 ppt	< 20 ppt
Dysprosium (Dy)	10 ppt	< 0.01 ppt	Strontium (Sr)	100 ppt	< 0.5 ppt
Erbium (Er)	10 ppt	< 0.01 ppt	Tantalum (Ta)	Information Only	< 1 ppt
Europium (Eu)	10 ppt	< 0.01 ppt	Tellurium (Te)	10 ppt	< 0.1 ppt
Gadolinium (Gd)	10 ppt	< 0.1 ppt	Terbium (Tb)	10 ppt	< 0.01 ppt
Gallium (Ga)	10 ppt	< 0.5 ppt	Thallium (Tl)	100 ppt	< 0.01 ppt
Hafnium (Hf)	Information Only	< 0.01 ppt	Thorium (Th)	10 ppt	< 0.01 ppt
Holmium (Ho)	10 ppt	< 0.01 ppt	Thulium (Tm)	10 ppt	< 0.01 ppt
Indium (In)	10 ppt	< 0.05 ppt	Tin (Sn)	100 ppt	< 10 ppt
Iron (Fe)	100 ppt	< 50 ppt	Titanium (Ti)	100 ppt	< 10 ppt
Lanthanum (La)	10 ppt	< 0.05 ppt	Tungsten (W)	Information Only	< 1 ppt
Lead (Pb)	10 ppt	< 0.05 ppt	Uranium (U)	10 ppt	< 0.01 ppt
Lithium (Li)	100 ppt	< 1 ppt	Vanadium (V)	100 ppt	< 0.1 ppt
Lutetium (Lu)	10 ppt	< 0.01 ppt	Ytterbium (Yb)	10 ppt	< 0.01 ppt
Magnesium (Mg)	100 ppt	< 5 ppt	Yttrium (Y)	10 ppt	< 0.01 ppt
Manganese (Mn)	100 ppt	< 0.5 ppt	Zinc (Zn)	100 ppt	< 5 ppt
Molybdenum (Mo)	100 ppt	< 0.5 ppt	Zirconium (Zr)	100 ppt	< 1 ppt

Most elements are determined by high resolution ICP-MS using sample preconcentration. The results are an average of three aliquots subsampled from three samples representative of the lot. The samples are slowly evaporated to dryness. The resulting residue is reconstituted in a small volume of SEASTAR™ **BASELINE®** 2% Nitric Acid / 2% Hydrogen Peroxide. For volatile elements (indicated by *), the acid samples are diluted then directly injected into the ICP-MS. Values below three times the standard deviation of the blank are shown with '<', no blank value is subtracted.

Greg Henson
QA & RA Manager

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

SEASTAR CHEMICALS ULC 2061 Henry Avenue West, Sidney, BC, Canada V8L 5Z6
Phone: 1-250-655-5880 | Toll free: 1-800-663-2330 (North America only)
www.seastarchemicals.com

SEASTAR CHEMICALS

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.

Greg Henson
QA & RA Manager