



HYDROCHLORIC ACID

PRODUCT NUMBER: S010401

LOT NUMBER: 4113080

RELEASE DATE: October, 2013

EXPIRY DATE: October, 2016

CERTIFICATE OF ANALYSIS

| Tests | Maximum Specification | Actual Value | Units | HCl (34 - 37%): Properties |
|-------------------|-----------------------|--------------|----------|----------------------------|
| Assay (HCl, w/w): | 34 - 37 % | 35% | % by w/w | Molar Mass: 36.46 g/mol |
| Colour (APHA): | 10 | < 7 | APHA | Density: 1.18 g/ml |
| | | | | Molarity: 12 moles/litre |
| | | | | Normality: 12 moles/litre |

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

| Analyte | Maximum Specification | Actual Value (in ppm) | Analyte | Maximum Specification | Actual Value (in ppm) |
|----------------------------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|
| Bromide (Br ⁻) | 10 ppm | < 10 | Total Phosphorus (P) | 0.01 ppm | < 0.01 |
| Free Chlorine (Cl ₂) | 0.5 ppm | < 0.5 | Total Sulphur (S) | 0.3 ppm | < 0.3 |

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