



# HYDROCHLORIC ACID

**PRODUCT NUMBER: S010401**

**LOT NUMBER: 4114070**

**RELEASE DATE: August, 2014**

**EXPIRY DATE: August, 2017**

## CERTIFICATE OF ANALYSIS

| Tests             | Maximum Specification | Actual Value | Units    | HCl (34 - 37%): Properties |
|-------------------|-----------------------|--------------|----------|----------------------------|
| Assay (HCl, w/w): | 34 - 37 %             | 34%          | % 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               | < 0.2                 | 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 <sup>-</sup> )       | 10 ppm                | < 10                  | Total Phosphorus (P) | 0.01 ppm              | < 0.01                |
| Free Chlorine (Cl <sub>2</sub> ) | 0.5 ppm               | < 0.5                 | Total Sulphur (S)    | 0.3 ppm               | < 0.3                 |

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