

WHITE PAPER

Ultrapure water for Trace Element Determination

Background

Accurate analysis of samples for ever lower concentrations of contaminants is becoming more important as the impact of trace quantities of inorganic ions on the environment, health and high-tech applications becomes more apparent.

Increasing sensitivity of analyses

Over recent years, the limits for contamination of soils and watercourses – as well as personal exposure limits for various metals – have been progressively lowered, due to evidence of a negative impact on health and the environment. Similarly, the importance of water purity is becoming more widely recognized for industrial applications, such as electronic wafer production, which has some of the lowest trace contaminant limits of any process worldwide.



As the limits of detection for trace contaminant analysis drop ever lower, pure water is becoming vital for a growing number of sectors. Ultimately, the success of any lab work is heavily dependent on the quality of the reagents used, including pure water, which influence the reliability of any experiments. Poorly maintained water supplies can reduce testing reproducibility, affecting the quality of standards, blanks and samples and, ultimately, can lead to poor testing results. Failure to use water of sufficiently high quality can also cause delays and instrumentation problems – for instance, from repeat analyses and unplanned downtime – costing labs time and money. It is therefore essential to use a water purification system, such as the ELGA PURELAB Chorus range* of products that offers production of a consistent supply of ultrapure water to ensure optimum assay sensitivity.

A purification solution

The ELGA PURELAB Chorus range* uses a series of purification technologies to remove the major types of impurities from feed water that might interfere with trace elemental analyses, as well as to prevent the build-up of particulates, such as bacteria, within the system. This prevents the degradation of standards and blanks that could otherwise interfere with instrument calibration or the accuracy of your results.

Studying water quality for trace analyses

The water purification performance of the ELGA PURELAB Chorus 1 Analytical Research (Chorus 1 ANR) was monitored over two months. Water was dispensed to simulate typical usage patterns, and samples were independently analyzed for a range of elements using high resolution inductively coupled plasma mass spectrometry (ICP-MS). Silica was determined by colorimetry. The results (Table 1) demonstrated that the values were below the limits of detection of the sensitive analytical instruments used for elemental analysis.



Table 1:

Element	Water from Chorus 1 (ppt [ng/l])
10	<1
Antimony	<0.2
Arsenic	<2
Barium	<0.5
Beryllium	<3
Bismuth	<0.2
Boron	<10
Cadmium	<0.5
Calcium	<2
Chromium	<1
Cobalt	<0.5
Copper	<1
Iron	<2
Lead	<0.2
Lithium	<0.2
Magnesium	<1
Manganese	<0.5
Mercury	<5
Nickel	<2
Platinum	<5
Potassium	<5
Silicon	<25
Silver	<0.5
Sodium	<2
Tin	<0.5
Titanium	<0.5
Vanadium	<0.2
Zinc	<2

Ion	
Bromide	<20
Chloride	<20
Fluoride	<20
Nitrate	<20
Nitrite	<20
Phosphate	<20
Sulphate	<20

Conclusion

Accuracy of trace inorganic analysis depends on high quality calibration standards and blanks. These, in turn depend on the purity of the water used, and user confidence in the reliability of purification. The PURELAB Chorus range uses technologies to ensure water is free from trace contaminants to easily meet the demands for high sensitivity and accurate results, while maximizing uptime and reducing lifetime running costs. It gives the user complete confidence in their results, eliminating a variable from experiments and allowing researchers to focus on their science.

*The PURELAB Chorus range offers a variety of different water purification systems, from the Chorus 1 that is used for the most critical and sensitive applications through to the Chorus 3, which is ideally suited for general purpose applications in your laboratory. The range is now available with an innovative free standing dispenser that maximizes space and improves lab efficiency. Additionally, Hubgrade – ELGA's digital platform – works alongside any system to monitor equipment performance, ensuring laboratory work continues uninterrupted.



Dedicated to Discovery

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ELGA Labwater are specialists in the engineering,
service & support of water purification systems.

Unrivalled product design has achieved
international recognition and awards.

Worldwide technical service teams support science
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Global digital performance monitoring from
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