

# Analysis of Environmental Waters by ICP-OES per Standard Method

Increase productivity and data quality with smart tools for the Agilent 5800 VDV ICP-OES

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## Fast analysis times: measure 32 elements in 57 s

National and international environmental protection organizations publish standard methods that allow analysts to test water samples in accordance with the relevant regulations. Chinese standard method HJ 776-2015 describes the analysis of 32 elements in various sample types, including surface water, groundwater, sewage, and industrial wastewater by ICP-OES. To analyze a range of water samples, laboratories need methods that are suitable for low-level analysis of surface and groundwater, with the linear dynamic range (LDR) needed for wastewater analysis.

The Agilent 5800 Vertical Dual View (VDV) ICP-OES fitted with a seven port Advanced Valve System (AVS 7) was used to analyze microwave acid digests of wastewaters according to HJ 776-2015. The AVS 7 improves productivity by reducing maintenance requirements on the VDV torch and reducing sample-to-sample measurement time down to 57 s.

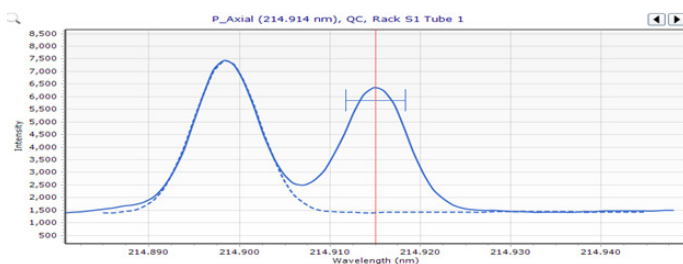
## Smart ways to stay productive

The 5800 ICP-OES was controlled using Agilent ICP Expert 7.5 software with MultiCal, IntelliQuant, Early Maintenance Feedback (EMF), and Neb Alert. These smart tools were used to extend instrument dynamic range, identify sample preparation errors, and monitor the sample introduction system.

The 5800 ICP-OES method was validated by analyzing two wastewater certified reference materials, Certified Waste Water – Trace Metals Solution D (High Purity Standards, USA) and NCS ZC 76307 (China National Analysis of Iron and Steel, China). All elements recovered within  $\pm 10\%$  of the expected values. See the application note for the full-data set.

## Background correction

The ICP Expert software includes easy-to-use background correction techniques including Fitted Background Correction (FBC), which is suited to background correction of both simple and complex backgrounds. Since interferences are likely to arise from background structures during the analysis of wastewater samples, FBC was used in this study to ensure more accurate measurements. The combination of the FBC algorithm and Vista Chip III detector accurately corrects background structures without analyst intervention or method development. All wavelengths were corrected using FBC. An example of automatic background fitting for P 214.914 nm using FBC is shown in Figure 1.

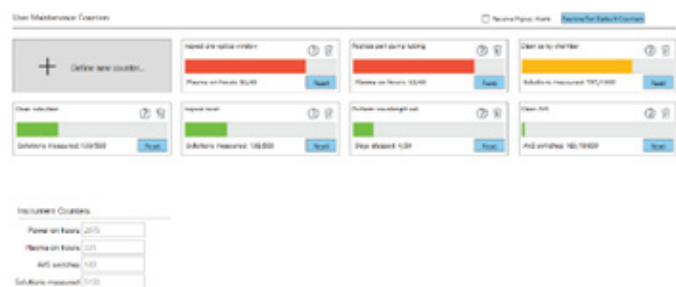


**Figure 1.** FBC automatically corrects for the nearby Cu peak to the left of P 214.914 (axial).

## Help with your maintenance schedule

Analyzing a range of water-sample types, especially samples with high levels of total dissolved solids, can be tough on the sample introduction system of an ICP-OES over long runs. However, ICP Expert software helps analysts schedule routine cleaning and maintenance using early maintenance feedback (EMF) indicators and Neb Alert.

EMF allows alerts to be set for instrument usage-based metrics. Various alerts can be set to remind analysts when to clean sample introduction components, replace pump tubing, clean/change pre-optics windows, clean the switching valve, and perform a wavelength calibration (Figure 2).



**Figure 2.** EMF monitors critical instrument parameters to maintain optimum analytical performance and reduce sample remeasurement.

High-matrix samples can cause the deposition of crystalline particles onto components of the ICP-OES sample introduction system, especially the nebulizer. To prevent having to remeasure samples due to a nebulizer blockage, Neb Alert uses sensors that monitor the nebulizer backpressure during analysis. The analyst is alerted if there is a potential blockage, so that the nebulizer can be cleaned, rather than continuing and collecting potentially incorrect data. Leakage from a nebulizer gas line also triggers an alert within Neb Alert.

Tracking instrument health and carrying out maintenance tasks at the right time ensures consistent, high-level analytical performance, while saving time and resources by avoiding unnecessary maintenance.

**Learn more:** Agilent publication [5994-3905EN](#).