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Streamlined Method Development with IntelliQuant Screening of DTPA Extracted Soil Samples

Agilent 5800 VDV ICP-OES smart features minimize sample remeasurements

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Determine all elements in a single analytical run

Soil samples were prepared for analysis according to Chinese HJ-804 method. Eight bio-available elements were measured in the DTPA extracted soil samples using the Agilent 5800 VDV ICP-OES fitted with an AVS 6 switching valve system and a SPS 4 autosampler.

Features within the Agilent ICP Expert software, such as IntelliQuant Screening, were used to assist with method development. This approach delivered high-quality results and minimized having to remeasure samples. An IntelliQuant-enabled quantitative worksheet provided semi-quantitative analysis and offered sample insights to complement the quantitative data.

Simple, three-step method development with IntelliQuant Screening

Method development can be tedious and time-consuming. Poorly developed methods can lead to inaccurate data being reported and costly remeasurement of samples. IntelliQuant Screening assists with method development in three easy steps:

Step 1: Run your sample with IntelliQuant Screening
IntelliQuant Screening is quick and easy to set up. There's no need to select any elements or wavelengths. IntelliQuant Screening captures data from the entire wavelength range in as little as 15 seconds. Automatic element discovery algorithms then choose the elements and wavelengths.

Step 2: Choose from available wavelengths to create a quantitative method
IntelliQuant Screening proposes a list of recommended wavelengths for every element detected in each sample.

For this application, all the wavelengths chosen by IntelliQuant Screening were also suggested in the HJ-804 regulated method, indicating the reliability of the IntelliQuant algorithm.

Using Mn as an example, IntelliQuant Screening gave multiple wavelengths a five-star quality rating, indicating that these wavelengths are likely to be suitable for a quantitative method (Figure 1).

Figure 1. IntelliQuant star rating table for Mn wavelengths. Clicking the red question mark shows information about why the wavelength is rated poorly. In this case, possible Fe interference was identifed on a primary Mn line.

IntelliQuant Screening gave a five star rating to both the Mn 257.610 nm and the 293.305 nm wavelengths, based on signal intensity, background structure, and freedom from interferences. The HJ-804 method also recommends these two wavelengths.

The red question mark next to the low-rated wavelength flags that there is an issue for this wavelength. The pop-up tips indicate that there is strong Fe interference, hence the one-star rating. Based on these sample insights, the wavelength was excluded from the final method.

Step 3: Run your samples and get semi-quantitative data
The quantitative analysis was performed using the wavelengths recommended by IntelliQuant Screening. During the analysis, another software function, IntelliQuant, was used to collect semi-quantitative data from each sample. This approach can be used to run a regulated method, while also gathering semi-quantitative data for up to 70 elements that may be present in a sample, as shown in Figure 2.

IntelliQuant uses the same automatic element discovery algorithms used in IntelliQuant Screening to assess the semi-quantitative data at each wavelength for each element. The software calculates the approximate concentration of all elements in a sample and automatically identifies the presence of spectral interferences.
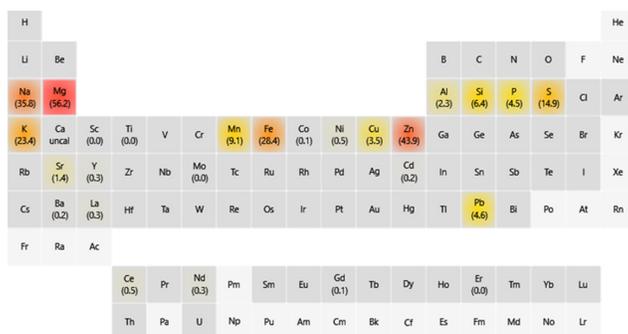
Figure 2. The IntelliQuant heat map shows relative concentrations of all elements in a sample.

For extra confidence in the final results, IntelliQuant data can be used to verify the full quantitative results. As shown in Table 1, the semi-quantitative concentrations determined by IntelliQuant were within ±25% of the full quantitative values, providing extra confidence in the analytical results.

Table 1. Comparison of quantitative and IntelliQuant data.

Element	Concentration (mg/L)		Element	Concentration (mg/L)	
	Quantitative	IntelliQuant		Quantitative	IntelliQaunt
Cd	0.15	0.17	Mn	8.57	9.12
Co	0.07	0.05	Ni	0.54	0.54
Cu	3.30	3.46	Pb	4.38	4.63
Fe	29.3	28.4	Zn	43.9	43.9

Learn more about your samples
The Agilent 5800 VDV ICP-OES is suitable for the routine analysis of eight bio-available elements in soil. IntelliQuant Screening and IntelliQuant increase the confidence in an analytical method and the final results. Knowing more about sample composition before analysis reduces the need for remeasurements, saving time and effort.

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