

# Multi-Element Analysis of Fertilizers by the Agilent 5110 VDV ICP-OES

Accurate measurement of 21 elements in under 60 s

## Author

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## Determine all elements in a single analytical run

Successful, high-yield crop production often depends on the application of fertilizers to ensure that the correct quantity of nutrients is available to plants during the growth cycle. Elemental analysis techniques provide valuable information on fertilizer quality, ensuring the correct quantity of fertilizer can be applied to achieve optimal crop yield.

In this study, 21 elements, including major nutrient, trace and toxic elements, were determined in fertilizer samples in a single analytical run using the Agilent 5110 Vertical Dual View (VDV) ICP-OES.

## Reproducible, accurate, and reliable results

Using Fitted Background Correction (FBC) to correct for interferences, multiple wavelengths of the same element were measured by the 5110 VDV ICP-OES. Figure 1 shows good accuracy between measurements. There is no time penalty in adding more wavelengths to the analysis due to the simultaneous, continuous wavelength coverage of the Vista Chip II detector.

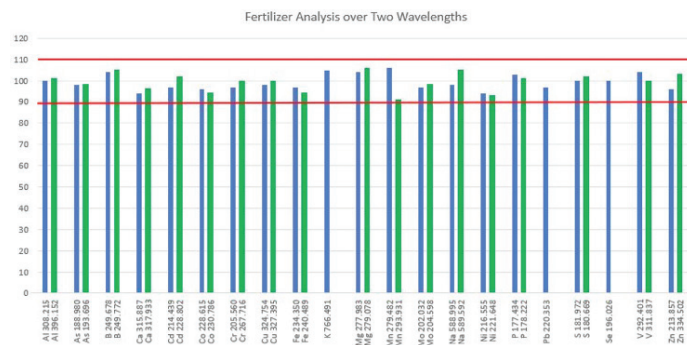


Figure 1. Verification of results using two wavelengths.

## Automatic background correction

The variation in analytes present in fertilizer samples was automatically corrected with FBC. Unique to Agilent, FBC removes background structures without the need for user intervention, ensuring reproducible and reliable results irrespective of the operator (Figure 2).

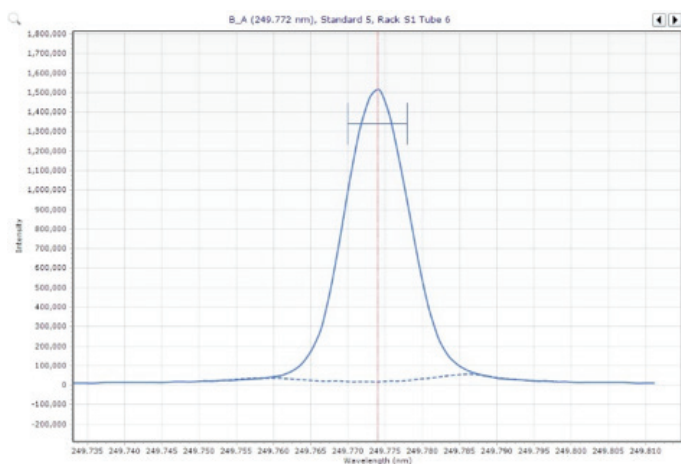


Figure 2. Automatic FBC for B 249.772 nm.

## Argon gas savings

All 21 elements were determined in 49 seconds using the 5110 fitted with the AVS 7 switching valve. Ar consumption per sample was 18.0 L. This was reduced to 13.2 L per sample (36 s analysis time) when the Synchronous Vertical Dual View (SVDV) configuration\* of the instrument (with the AVS 7) was used. This means 213 more samples could be run in an 8-hour day.

## Rapid full spectrum scan

IntelliQuant scans the full spectrum in less than 15 seconds, identifying and semiquantifying up to 70 elements. The IntelliQuant heat map shows all the detected elements and their approximate concentration (ppm). For the fertilizer SRM sample, the scan provided information for Ba, Sn, Sr, and Ti (Figure 3), that were not included in the method.

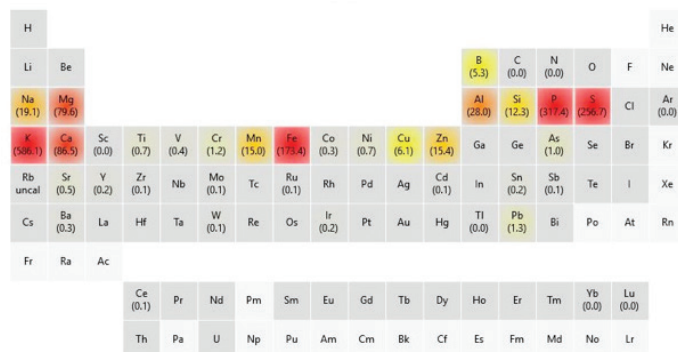


Figure 3. IntelliQuant analysis heat map of the fertilizer SRM.

## Long-term stability

478 spiked fertilizer samples were analyzed over 6.5 hours without recalibration (Figure 4). The robust SSRF and the vertically orientated torch ensure that excellent repeatable performance is achieved, sample to sample, hour after hour.

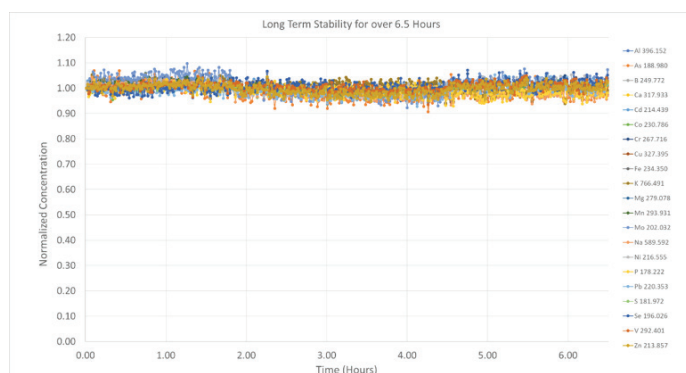


Figure 4. Normalized concentration of 21 elements in 478 spiked fertilizer samples analyzed repeatedly for over 6.5 hours.

## Conclusion

The Agilent 5110 VDV ICP-OES proved suitable for the routine, high throughput analysis of 21 key elements in fertilizers. Fitted with the AVS 7 switching valve the 5110 VDV ICP-OES, achieved an analysis run time of 49 s with 18 L of total argon per sample.

[Download the full application note](#)

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\*The 5110 VDV configuration can be upgraded to operate in SVDV mode.

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