

MILK POWDER ANALYSIS USING CHINESE GB 5413.21—2010 METHOD & AGILENT 5100 SVDV ICP-OES

APPLICATION OVERVIEW



Agilent's 5100 Synchronous Vertical Dual View (SVDV) ICP-OES

Introduction

The 5100 Synchronous Vertical Dual View (SVDV) ICP-OES has a range of features that simplify the analysis and sample preparation procedures required for the Chinese National Food Safety Standard (GB 5413.21—201) for measuring Ca, Fe, Zn, Na, K, Mg, Mn and Cu in milk powder for infants.

Key benefits for milk powder analysis

Eliminate dilutions: The instrument's Synchronous Vertical Dual View (SVDV) mode measures the axial and radial views of the plasma at the same time. This allows major elements, such as Na and K to be measured together with trace elements, eliminating the need for different dilutions to cater for the different concentrations of the elements in the sample.

Fast and cost-effective sample analysis: Synchronous Vertical Dual View (SVDV) mode allows faster sample-to-sample analysis, with less argon consumption per sample. For typical analyses, it's 55% faster and uses 50% less argon than conventional dual-view ICP-OES instruments.

Easy to use: By measuring both the axial and radial views at the same time, settings such as the plasma viewing mode are no longer required. As analysis can typically proceed using default gas flow settings, you can simply choose your elements and wavelengths and the instrument will collect all the data you need in a single synchronous measurement.

Reproducible performance: A plug and play torch that is automatically aligned and connected to the gases delivers a fast startup and reproducible performance, even with multiple operators.



Analysis example

A standard reference material for milk powder (SRM 8435) was obtained from the National Institute of Standards and Testing in the USA. Analysis of this material using the GB 5413.21—2010 method on the 5100 SVDV instrument yielded the results shown below:

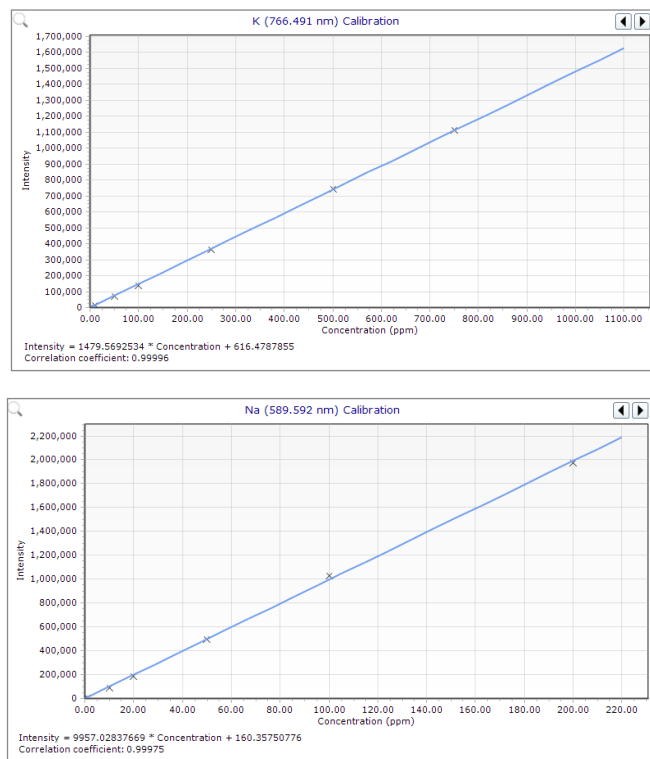


Figure 1. Calibration curves for K 766.491 nm and Na 589.592 nm show excellent linearity over a wide calibration range.

To download full application note, go to:

<https://www.agilent.com/cs/library/applications/5991-4900EN.pdf>

Table 1. Method detection limits, as per GB 5413.21—2010 guidelines and results from the analysis of a milk powder standard reference material using the 5100 SVDV ICP-OES. All were determined in a single analytical run.

Element & wavelength	MDL (mg/100 g)	Specified ¹ MDL (mg/100 g)	Certified value ² (mg/kg)	Measured values (mg/kg)	Recovery (%)
Major					
K 766.491	0.17	0.7	13630	13070	96
Ca 315.887	0.01	0.7	9220	9750	106
P 213.618	0.02	N/A	7800	7160	92
Na 589.592	0.01	1.6	3560	3530	99
S 181.972	0.11	N/A	2650	2650	100
Minor					
Mg 279.078	0.01	0.2	814	749	92
Zn 202.548	0.0006	0.002	28	28.9	103
Sr 421.552	0.00005	N/A	4.35	4.37	101
Fe 259.940	0.001	0.003	1.8	1.9	107
Cu 327.395	0.001	0.002	0.46	0.46	100
Mo 204.598	0.003	N/A	0.29	0.27	92
Mn 257.610	0.0003	0.005	0.17	0.18	103

1. As specified in the GB 5413.21 method

2. Certified values supplied with SRM

The analysis results show:

- Wide linear dynamic range, with correlation coefficients greater than 0.999 for all elements, in particular Na, linear up to 200 ppm, and K, linear up to 750 ppm.
- Excellent Method Detection Limits, below those specified in the GB method.
- Accurate results, with recoveries within $\pm 10\%$ of certified values for elements determined in the NIST 8435 Whole Milk Powder Standard Reference Material (SRM).
- Each sample measurement took 68 seconds and used less than 24 litres of Ar. This equates to 50 samples per hour or 400 samples per 8 hr work day.

For more information:
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