Xenemetrix

The Power to Change Energy Into Information

Analysis of Fe, Cu and Zn in raw material food additives

Analyzer: X-Calibur

Equipped with Silicon Drift Detector (SDD)

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Abstract

This work demonstrates the remarkable performance of Xenemetrix made X-Calibur for the analysis of Fe, Cu and Zn in raw material for food additives. The analysis was performed on crude sample without any sample preparation. Both Quantitative and qualitative results were obtained after analysis time of two minutes.

Objective

Quantitative analysis of Fe, Cu and Zn in raw material for food additives

Background

EDXRF is an ideal analytical technique for a quick and simple elemental analysis tests for industrial control purposes. This analytical technique is extremely quick, non-destructive, requiring minimal sample preparation, and very little training. Therefore it has become one of most used techniques for analysis of raw materials and end products.

Analytical Configuration

Table 1: Instrumental analytical configuration

Instrument	X-Calibur with SDD detector
Excitation	Rh-Anode X-ray Tube, 50KV 50W
Detector	High Performance Silicon Drift Detector SDD with high transmittance window
Analysis Time	120 seconds
Type of analysis and acquisition conditions	Quantitation of Cu Zn and Fe concentrations in food additives
Environment	Air
Sample preparation	Samples were analyzed as obtained in X ray cups with 4μ Prolene film support

Experimental and Results

Food additive raw material powder was provided for analysis of Fe, Cu and Zn. The spectra was acquired with X-Calibur-SDD benchtop EDXRF analyzer without sample preparation. Other elements as Br, Sr, K and Ca were also detected (figure 1). Calibration for Fe and Cu were done by single point calibration (figure 2) while series of dilutions from stock solution were included in the Zn curve (figure 3). The quantitative results of the elements in the powder are listed in table 2.

Figure 1: Qualitative analysis of Raw Material sample

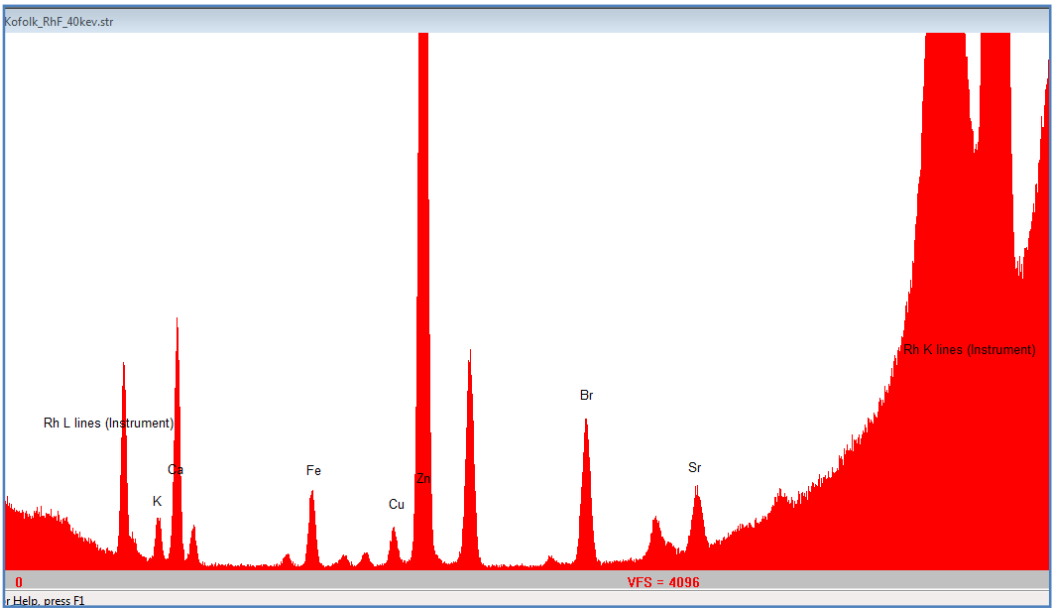
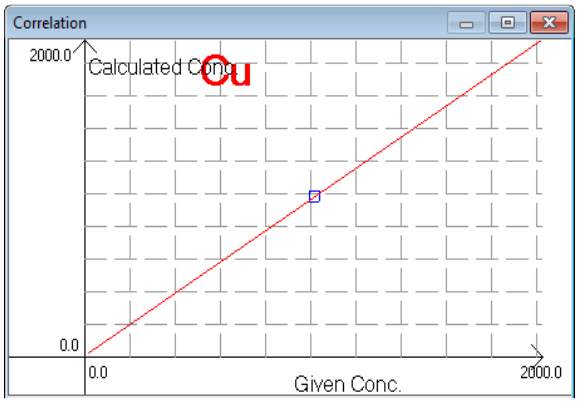


Figure 2: Single point calibration curve for Cu and Fe



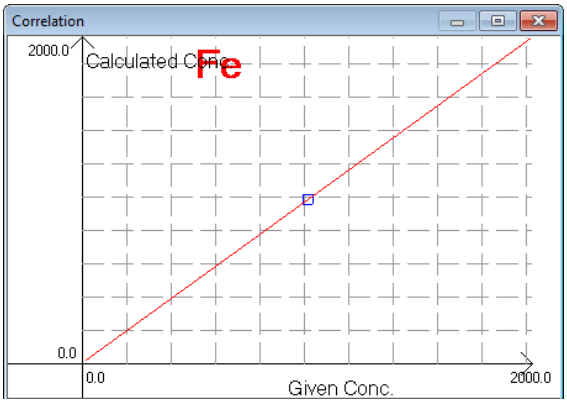
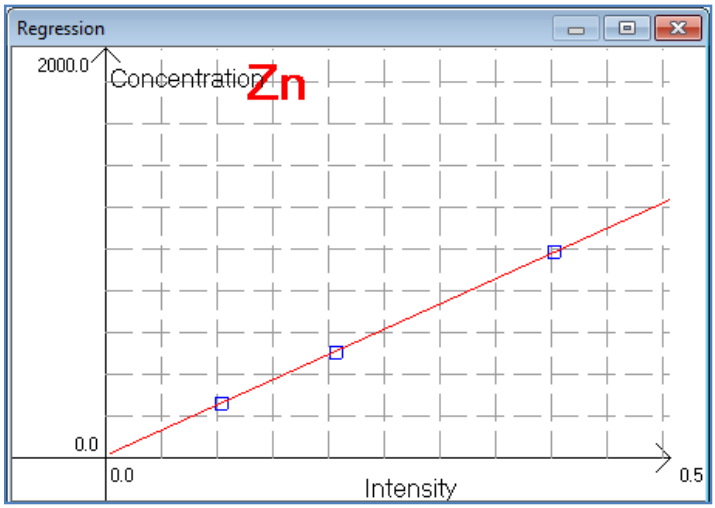


Figure 3: Calibration curve for Zn in water (250, 500 and 1000 dilutions).



Report 1: Calibration report for Zn in water.

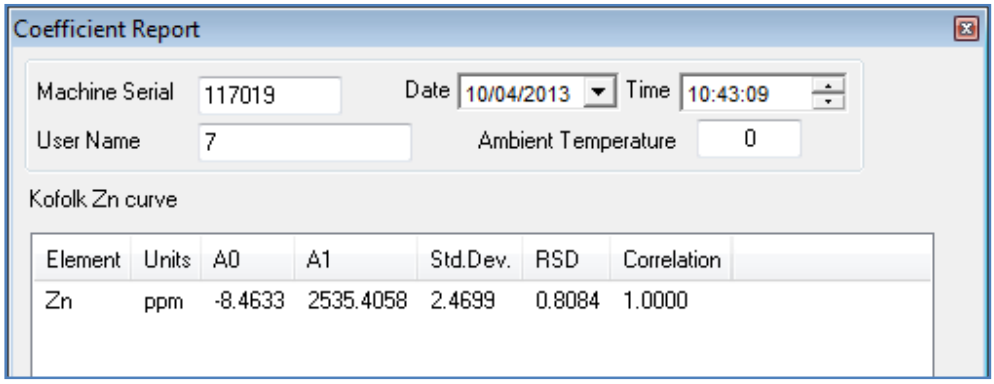


Table 2: Summary of food additive content in the raw material sample.

Element	Standard concentration (mg/kg)	Type of calibration	Sample concentration (mg/kg)
Cu	1000	Single point calibration	59
Fe	1000	Single point calibration	408
Zn	1000 (stock solution)	Series of dilution: 1000, 500, 250 mg/kg	878

Discussion

The sample was analyzed in powder form, while the calibration curves were made with certified standards in water. Generally it is advised, in XRF practice, to use the same matrix for the samples as for the standards. Another possibility is to use working standards (samples analyzed by traditional analytical methods) for preparation of the calibration curve for EDXRF analysis.

Conclusion

The X-Calibur SDD is a very powerful EDXRF analyzer equipped with Rhodium anode tube, a high resolution SDD detector to make the most accurate and precise analysis of food and feed products. Excellent results were obtained for Cu, Fe and Zn content in raw material food powder.