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# EDXRF1457 - Analysis of copper in ore for exploration and ore grade control



## Scope

The analysis of copper in ore is demonstrated, suitable for exploration and ore grade control at the mine site.

## Background

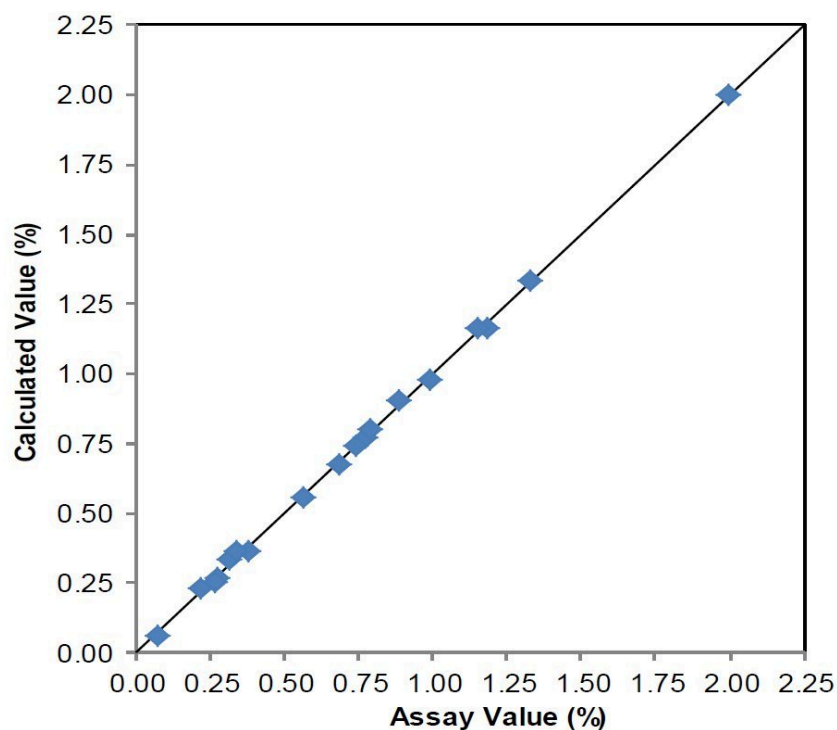
Elemental analysis is crucial for screening samples at the mine site and throughout the processing of ores. During smelting, major and minor elements are also closely monitored in the ore, concentrates, slags, and tails. Rigaku offers the NEX QC Series of analyzers to meet these analytical needs of the mining industry, both at the mine site and the smelter. Simple yet versatile, the NEX QC is transportable for mine site screening, rugged enough for the smelting operations, and powerful enough for work in a central lab. The [NEX QC](#) utilizes 50 kV direct excitation and a high-performance semiconductor detector to provide excellent sensitivity in a low-cost tool ideal for analyzing ore materials.

## Calibration

Empirical calibration gives the most accurate means of analysis. A typical calibration plot is provided here using 18 assayed standards provided by a major copper mine containing  $\text{Fe}_3\text{O}_4$  between 10 – 25%. Alpha corrections are employed to automatically compensate for variations in X-ray absorption and enhancement effects within the sample due to the independent variations in iron content. While as few as 8 standards can be used to calibrate, increasing the number of standards optimizes accuracy.

Element: Cu  
Units: %

Sample I.D.	Assay value	Calculated value
UG1	0.772	0.7686
UG2	0.992	0.9806
UG3	0.275	0.2661
UG5	0.684	0.6751
UG6	0.563	0.5560
UG8	0.741	0.7427
UG10	1.185	1.1655
UG11	1.151	1.1647
UG13	0.071	0.0585
UG20	0.378	0.3657
UG21	0.266	0.2506
UG22	0.791	0.8004
UG23	0.312	0.3327
UG24	0.340	0.3624
UG25	0.219	0.2337
UG26	1.999	1.9978
UG27	1.329	1.3311
UG28	0.888	0.9038



Correlation plot of copper

## Repeatability

To demonstrate repeatability (precision), low, medium, and high copper samples were chosen from the set of calibration standards. Samples were each measured for ten repeat analyses in static position. Typical results are shown below.

Sample	Cu standard value (mass %)	Cu average value (mass %)	Standard deviation	RSD (%)
UG25	0.219	0.225	0.003	1.4
UG2	0.992	0.987	0.004	0.4
UG26	1.999	1.999	0.010	0.5

## Conclusion

The Rigaku NEX QC offers the copper industry a simple yet powerful and versatile tool for identifying and quantifying elemental composition of a wide variety of materials. The NEX QC is an excellent tool for screening and quantifying copper ore from the mine. Given similar calibration standards for the stages of smelting, control through the beneficiation, sintering, blending and throughout the smelting process can be maintained as well for several elements of interest in addition to copper. With a small footprint and modern touchscreen interface, the modern Rigaku NEX QC analyzer is transportable, rugged and reliable, and ideal for use in copper production

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## Related products



### NEX QC Series

Combines quality, affordability, and performance for a wide range of applications