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EDXRF1480 - Analysis of Iron Concentrates



Scope

The measurement of iron, silicon dioxide, and sulfur in magnetite ore concentrate is demonstrated.

Background

Ore is ground, cleaned, separated, and concentrated in preparation for smelting. Impurities such as silicon dioxide and sulfur are considered penalty elements as they can adversely affect the quality of the beneficiation, concentrating, and smelting processes, as well as the final properties of the iron or steel being produced. Rigaku [NEX QC+](#) offers technicians a fast and simple means of monitoring elemental composition of ores and concentrates, and is a tool that can be used for quality checks throughout the entire smelting process.

Calibration

21 standards were used to build an empirical calibration. Empirical regression returns the highest degree of accuracy. Fewer standards can be used, a minimum of 10 standards are required to achieve the minimum number of degrees of freedom required. More standards give more degrees of freedom and a higher degree of accuracy. A summary of the calibration is shown here.

Element	Concentration range
Fe	64 – 72%
SiO ₂	0.20 – 8.77%
S	0.002 – 0.074%

Repeatability

To demonstrate repeatability, three calibration standards were selected to show the lower and higher levels of SiO₂ and S. Each was measured in 10 repeat analyses without moving the sample between measurements to determine an average value for precision.

Standard	% Fe assay value	% Fe average value	Std. dev	% Relative dev
3	71.13	71.04	0.06	0.1
2	71.52	71.47	0.02	0.1
21	64.19	64.08	0.06	0.1

Standard	% SiO ₂ assay Value	% SiO ₂ average value	Std. dev	% Relative dev
3	1.18	1.17	0.02	1.7
2	0.65	0.67	0.008	1.2
21	8.77	8.69	0.10	1.1

Standard	% S assay value	% S average value	Std. dev	% Relative dev
3	0.010	0.011	0.0004	4.0
2	0.005	0.007	0.0001	2.0
21	0.074	0.079	0.0007	0.9

Conclusion

The NEX QC+ offers the lab analyst or field operator at the mine site or smelter a simple and fast tool for measuring Fe, SiO₂ and S content of concentrates, vital for smelting control and ensuring product grade, minimizing penalties. Given proper reference standards for calibration, the NEX QC+ can be used for measuring ores and is an excellent tool throughout the smelting process for monitoring feeds, filter cakes, mattes, tailings and slags, as well as concentrates.

Related products



NEX QC Series

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