Application Note EDXRF1299

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EDXRF1299 - Gold Processing

Scope

The at-line analysis of gold in impregnated stripping solutions during the electrowinning process is demonstrated.

Background

Gold ore processors commonly utilize the cyanide leaching technique to recover trace gold content. After the gold is leached out of the ore, it is typically absorbed onto activated carbon in processes such as Carbon-in-Pulp (CIP), Carbon-in-Leach (CIL), or Carbon Column (CC). Once absorbed, the gold is stripped from the Carbon and the impregnated stripping solution fed into the electrowinning process where the gold is recovered by electrolysis. By measuring the gold in the stripping solution at-line, operators can quickly and easily determine when the solution will be barren of gold, significantly improving the plant's efficiency. The Rigaku NEX QC+ offers a simple and low cost at-line analytical technique for measuring such solutions. Non- technical operators obtain results in as little as 100 seconds without the need for special sample preparation, sample conditioning or technical knowledge.

Unit conversion

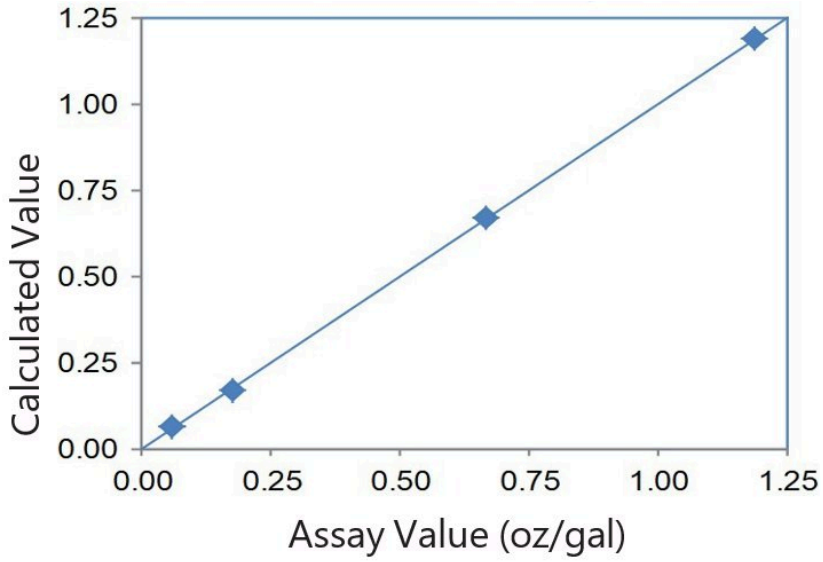
The simple conversion shown here is made without conversion for relationship between volume of liquid solution to volume of ore material.

1 troy oz/ton = 34.3 ppm
1 ppm = 0.029 troy oz/ton

Calibration

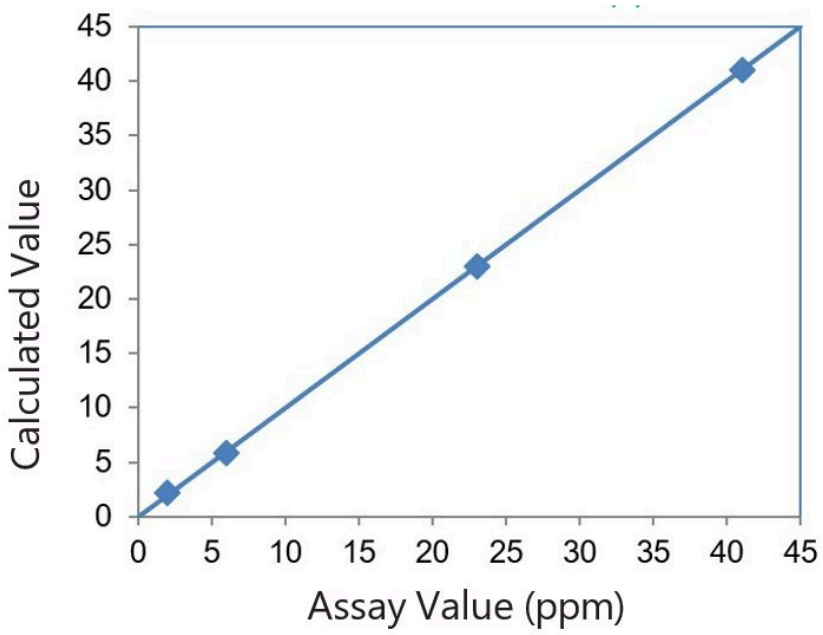
A simple linear empirical calibration was built using a suite of 4 calibration standards assayed by AA. Calibration can be made in units of ppm or troy oz/ton.

Element: Au **Units: troy oz/ton**		
Sample I.D.	**Assay value**	**Calculated value**
2	0.058	0.064
6	0.174	0.168
23	0.667	0.667
41	1.189	0.667



Correlation plot Au troy oz/ton

Element: Au **Units: ppm**		
Sample I.D.	**Assay value**	**Calculated value**
2	2.0	2.2
6	6.0	5.8
23	23.0	23.0
41	41.0	41.0



Correlation plot Au ppm

Precision

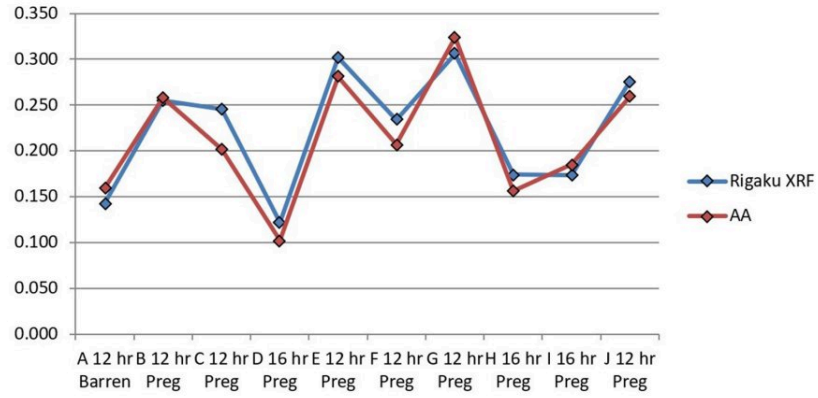
Instrument repeatability (precision) is determined by ten repeat analyses of a sample in static position. Precision results are summarized here.

Element: Au **Units: troy oz/ton**			
Sample	**Standard value**	**Average value**	**Std. dev**
2	0.058	0.070	0.012
6	0.174	0.168	0.017
23	0.667	0.661	0.020
41	1.189	1.175	0.020

Element: Au **Units: ppm**			
Sample	**Standard value**	**Average value**	**Std. dev**
2	2.0	2.4	0.4
6	6.0	5.8	0.6
23	23.0	22.8	0.7
41	41.0	40.5	0.7

Comparison to AA technique

Several unknown samples were measured by AA (Atomic Absorption spectroscopy) and NEX QC+ in side-by-side testing. The results are shown here and indicate excellent correlation between AA and Rigaku XRF.



Conclusion

The NEX QC+ offers analysts and technicians a simple yet powerful and versatile system for quantifying elemental composition using the empirical approach. The results of this study indicate that given stable samples, proper sample handling and proper calibration technique, the Rigaku NEX QC+ EDXRF can achieve excellent results in monitoring the concentration of gold in strip solution during the processing of ores, tailings and slags.

Related products

NEX QC II Series

Compact, intuitive benchtop EDXRF for everyday elemental testing