EDXRF Application Note
Cu Wood Treatment

#1337

SCOPE

The measurement of copper (Cu) in wood treatment solution is demonstrated.

BACKGROUND

Wood treatments are used to protect lumber from fungi, insects, UV damage and general wear. Lumber treated with copper or copper oxide is used in a variety of residential and commercial construction projects, including house and building foundations, fences, patio decks and playground playscapes. When treating wood, the proper balance of treatment solution must be monitored to ensure the highest quality while minimizing waste and excess cost due to treatment usage or product rejection. Cu or CuO levels are monitored in solution prior to treatment, and then in the wood to ensure proper retention. A quick, simple, reliable means of analysis is required throughout the quality control process. XRF is an ideal tool for such analysis.

INSTRUMENTATION

Model:	Rigaku NEX OL Analyzer
Excitation:	Direct with filters
X-ray tube:	4 W Ag-anode
Detector:	SDD

Total Measurement Time = 60 sec

SAMPLE PREPARATION

No sample preparation treatment is required. All samples were measured in a static position using the auxiliary sample input loop.

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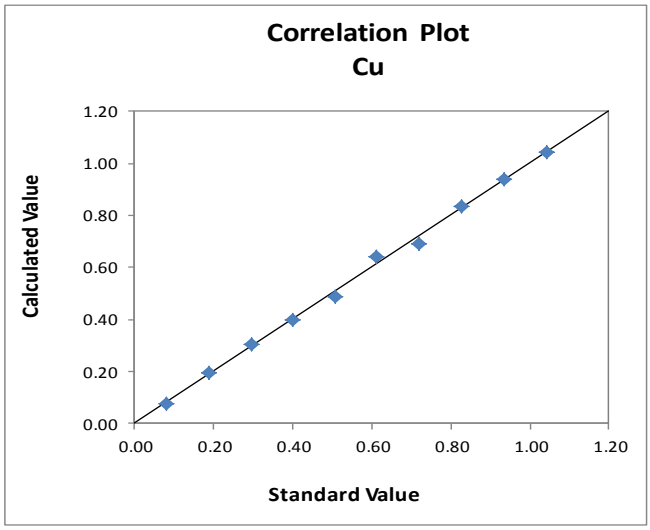
CALIBRATION

An empirical calibration was built using a set of assayed solution standards using a measurement time of 60 seconds per sample.

Cu Units: %		Std Error of Est: 0.017 Correlation: 0.99781
Sample I.D.	Assay Value	Calculated Value
1	0.080	0.076
2	0.187	0.196
3	0.294	0.303
4	0.400	0.396
5	0.507	0.489
6	0.613	0.64
7	0.720	0.692
8	0.827	0.832
9	0.934	0.938
10	1.041	1.041



REPEATABILITY – Cu in Solution

To demonstrate repeatability (precision), the low and high samples were chosen from the set of calibration standards. Each sample was measured in static position for ten repeat analyses using a measurement time of 60 seconds per sample.

Cu Units: %				
Sample ID	Standard Value	Average Value	Std Dev	% Relative
1	0.080	0.0815	0.0008	1.0
10	1.041	1.0431	0.0024	0.2

TYPICAL DETECTION LIMITS

To determine the Lower Limit of Detection (LLD) using the empirical method, ten repeat analyses of a blank sample (DI water) is measured and the standard deviation calculated. The LLD is then defined as three times the standard deviation. The following detection limits are shown using a measurement time of 60 seconds.

Compound	LLD
Cu	0.0007%

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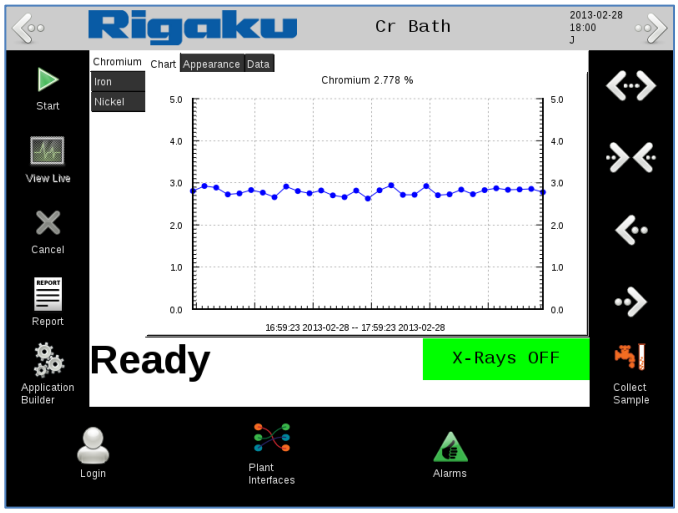
NEX OL FEATURES & BENEFITS

- Real-time process control
- Trend analysis charting
- Capable of measuring elements Al to U, depending on application
- Robust Rigaku NEX QC+ optical kernel with SDD detector
- Industrial touch screen user interface
- Unique toolless flow cell design
- No dangerous radioisotopes



Example of trend charting

ON-LINE and AT-LINE

On-line systems are often used for trend analysis in conjunction with a benchtop analyzer for at-line analysis and periodic validation of on-line results. Rigaku offers both systems for optimum process and quality control.

NEX OL

NEX QC

CONCLUSION

The NEX OL offers real time trend analysis in a simple yet powerful and versatile system for quantifying the elemental composition of a process stream. The results of this study indicate that given stable samples, proper sample handling and proper calibration technique, the Rigaku NEX OL EDXRF can achieve excellent results in monitoring the concentration of copper in wood treatment and other solutions.

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