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EDXRF1175 - CCA Wood Treatment



Scope

This application note demonstrates the measurement of chromated copper arsenate (CCA) treated wood and wood treatment solutions using [NEX QC](#).

Background

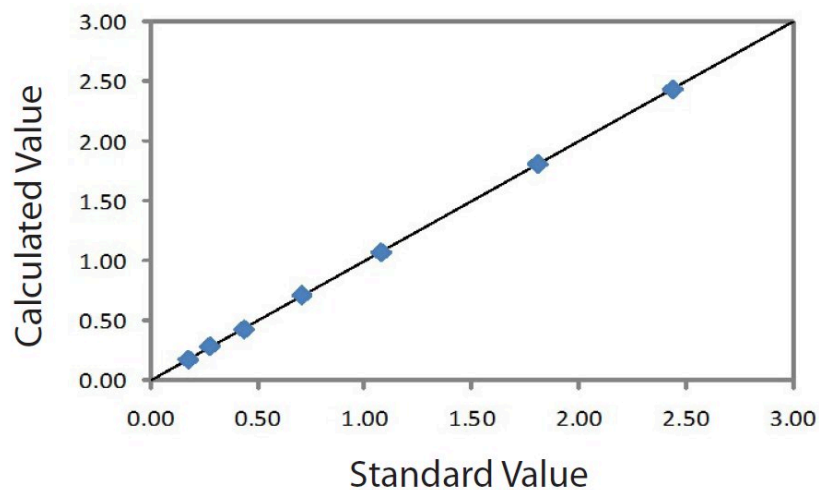
Wood treatments are used to protect lumber from fungi, insects, UV damage and general wear. In recent years, the US EPA has asked for voluntary compliance to restrict the use of CCA due to concerns about chromium and arsenic leaching into soils. Lumber treated with CCA is used in a limited number of situations, such as in roofing shingles, permanent building foundations, and certain commercial applications. 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. Chromium, copper and arsenic 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.

Calibration – CCA in wood

An empirical calibration was built using a set of assayed wood standards.

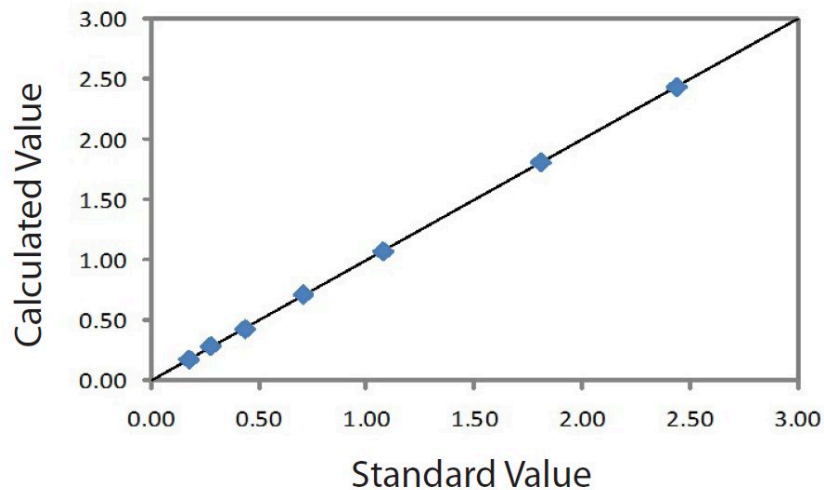
Element: CrO_3		
Units: %		
Sample I.D.	Standard value	Calculated value
W-C	0.46	0.464

W-D	0.62	0.612
W-E	0.86	0.844
W-G	1.52	1.560
W-H	2.05	2.058
W-I	3.00	2.951
W-J	4.15	4.164



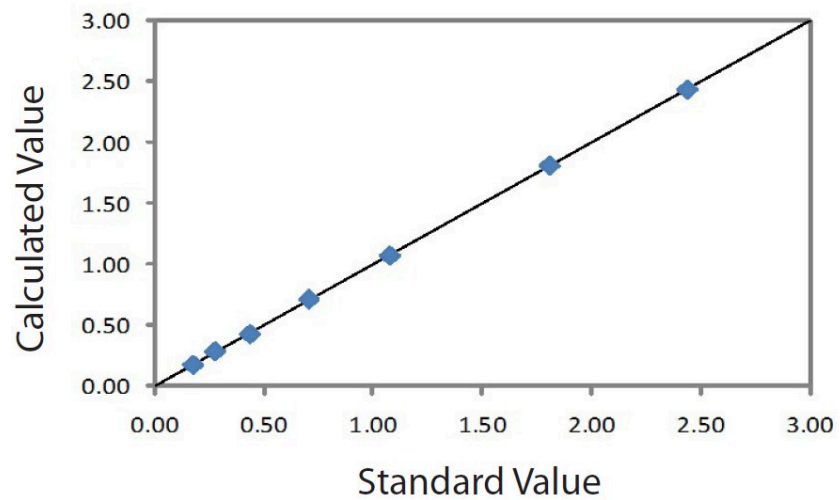
Calibration plot CrO_3 in wood

Element: CuO		
Units: %		
Sample I.D.	Standard value	Calculated value
W-C	0.18	0.185
W-D	0.24	0.237
W-E	0.32	0.309
W-G	0.56	0.591
W-H	0.74	0.726
W-I	1.10	1.083
W-J	1.59	1.599



Calibration plot CuO in wood

Element: As ₂ O ₅		
Units: %		
Sample I.D.	Standard Value	Calculated Value
W-C	0.33	0.328
W-D	0.43	0.427
W-E	0.58	0.586
W-G	1.04	1.052
W-H	1.42	1.420
W-I	2.13	2.045
W-J	3.02	3.024



Calibration plot As₂O₅ in wood

Repeatability – CCA in wood

To demonstrate repeatability (precision), the low and high samples were chosen from the set of calibration standards. Each sample was measured in static position.

Element: Cr₂O₃ Units: %				
Sample I.D.	Standard Value	Average Value	Std. Dev	% Relative
W-C	0.46	0.463	0.004	0.9
W-J	4.15	4.155	0.011	0.6

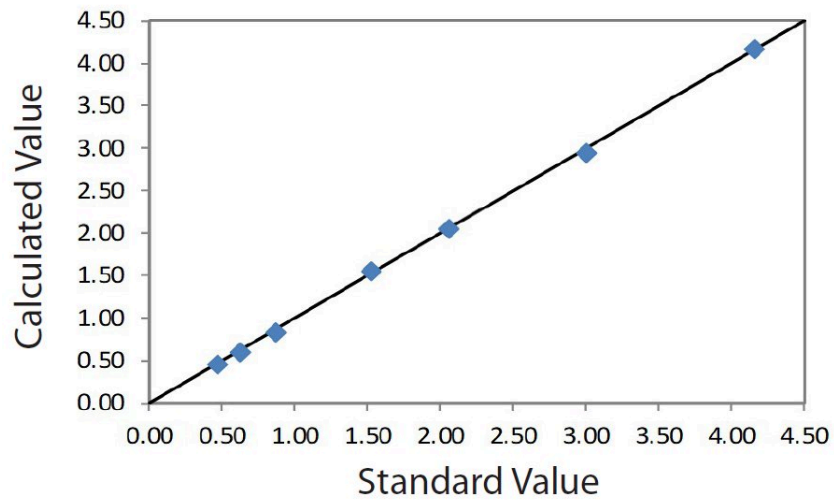
Element: CuO Units: %				
Sample I.D.	Standard Value	Average Value	Std. Dev	% Relative
W-C	0.18	0.187	0.001	0.5
W-J	1.59	1.653	0.012	0.8

Element: As₂O₅ Units: %				
Sample I.D.	Standard Value	Average Value	Std. Dev	% Relative
W-C	0.33	0.331	0.001	0.3
W-J	3.02	3.044	0.017	0.6

Calibration – CCA in solution

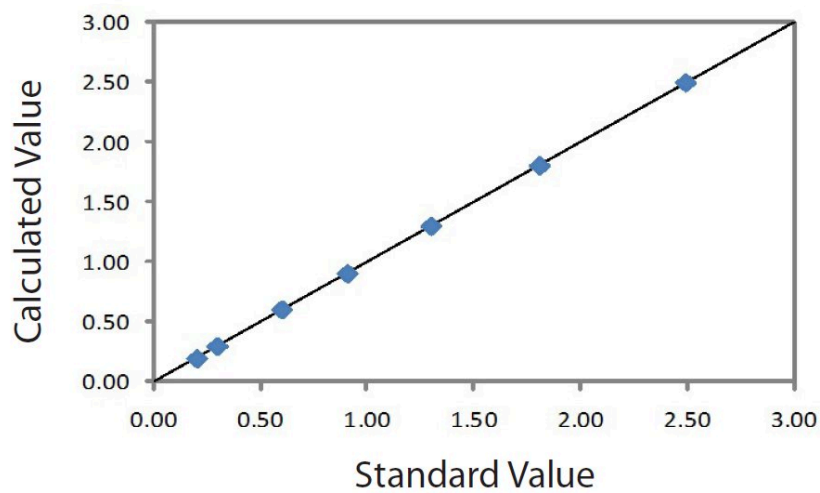
An empirical calibration was built using a set of assayed solution standards.

Element: CrO₃ Units: %		
Sample I.D.	Assay value	Calculated value
S-A	2.859	2.862
S-C	3.099	3.118
S-D	3.215	3.197
S-E	3.336	3.355
S-G	3.573	3.524
S-H	3.811	3.835



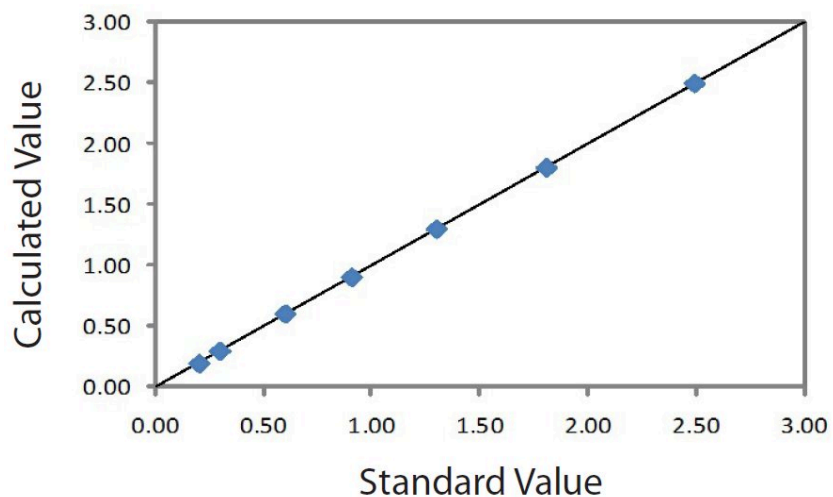
Calibration plot CrO_3 in solution

Element: CuO		
Units: %		
Sample I.D.	Assay value	Calculated value
S-A	1.050	1.056
S-C	1.139	1.145
S-D	1.182	1.182
S-E	1.266	1.246
S-G	1.313	1.310
S-H	1.400	1.411



Calibration plot CuO in solution

Element: As ₂ O ₅		
Units: %		
Sample I.D.	Assay value	Calculated value
S-A	2.082	2.0770
S-C	2.257	2.2640
S-D	2.342	2.3320
S-E	2.430	2.4560
S-G	2.603	2.6030
S-H	2.755	2.7570



Calibration plot As₂O₅ in solution

Repeatability – CCA 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.

Element: Cr ₂ O ₃				
Units: %				
Sample I.D.	Standard value	Average value	Std. dev	% Relative
S-A	2.859	2.855	0.0173	0.6
S-H	3.811	3.818	0.0229	0.6

Element: CuO				
Units: %				

Sample I.D.	Standard value	Average value	Std. dev	% Relative
S-A	1.050	1.057	0.0033	0.3
S-H	1.400	1.409	0.0068	0.5

Element: As₂O₅

Units: %

Sample I.D.	Standard value	Average value	Std. dev	% Relative
S-A	2.082	2.078	0.0174	0.8
S-H	2.755	2.751	0.0161	0.6

Retention report

To measure a wood sample, enter the density of the wood. The measurement calculates concentrations of Cr₂O₃, CuO and As₂O₅ and also outputs balance and retention values.

CCA WOOD
App Note

2011-11-01
16:48
admin

Start
View Live
Stop
Job
Application Builder

Sample ID: wood
Timestamp: 16:29:34 2011-11-01
Instrument: NEX QC S/N QC1002
Product: CCA WOOD
App Note
Density: 32.000 PCF

ID	Concentration	Balance	Retention
Cr03	0.6167 %	48.2 %	0.197 PCF
Cu0	0.2380 %	18.6 %	0.076 PCF
As205	0.4251 %	33.2 %	0.136 PCF
Totals	1.28 %	100%	0.410 PCF

Print Report
PgUp
PgDown
Next Report
Previous Report

Ready

X-Rays OFF

Conclusion

The typical results detailed here show exceptional performance for the fast and simple measurement of CCA in wood and solution. The Rigaku NEX QC is an excellent tool along the QC process in producing treated lumber, giving the production process an affordable means of optimizing quality while minimizing costs and helping to minimize product rejection and waste.

Related products



NEX QC Series

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