Application Note EDXRF1693

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EDXRF1693 - Ni:Fe Metallurgy

Scope

This application note demonstrates the measurement of the major binary alloy elements nickel and iron, and the critical tramp elements phosphorus, sulfur, and arsenic using NEX DE.

Background

In the metallurgical production of metals and alloys, it is important to ensure proper balance of the major alloy metals, and it is critical to ensure certain harmful tramp elements are at sufficiently low concentration or not present. Applied Rigaku Technologies EDXRF systems offer a simple and non-destructive means of quickly testing ingots and sample slugs to ensure these properties are optimized.

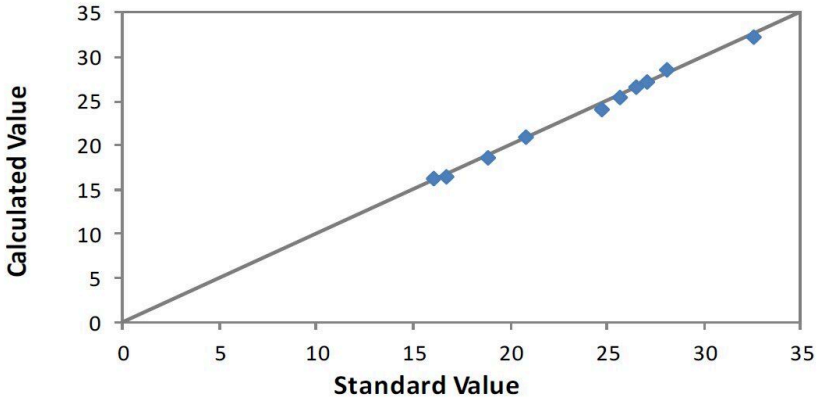
Calibration

10 assayed calibration standards were provided by a major metallurgy company producing nickel alloys.

Ni calibration

Element: Ni **Units: mass %**		
Sample I.D.	**Standard value**	**Calculated value**
9901	16.67	16.579
9902	18.85	18.594

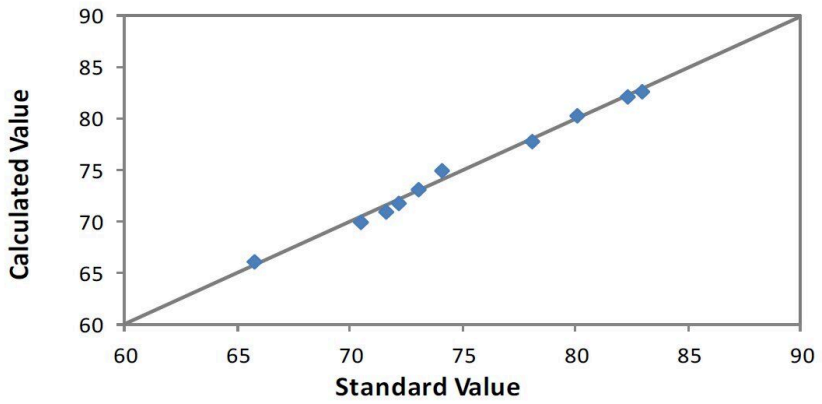
9903	25.68	25.459
9904	16.02	16.353
9905	26.48	26.620
9906	27.06	27.194
9907	24.67	24.089
9908	28.10	28.616
9909	32.57	32.374
9910	20.74	20.961



Correlation plot Ni

Fe calibration

Element: Fe **Units: mass %**		
Sample I.D.	**Standard value**	**Calculated value**
9901	82.304	82.120
9902	80.069	80.399
9903	73.037	73.220
9904	82.906	82.676
9905	72.142	71.903
9906	71.576	71.014
9907	74.067	75.082
9908	70.435	70.029
9909	65.743	66.065
9910	78.058	77.835



Correlation plot Fe

Tramp elements

Element	Concentration range mass %
P	0.008 – 0.027
S	0.054 – 0.215
As	0.039 – 0.125

Precision results

To demonstrate typical precision (repeatability) standard 9905 was measured 10x in static position.

Sample: Standard 9905 **Units: mass %**				
Element	**Standard value**	**Average value**	**Standard deviation**	**% Relative dev**
Ni	26.48	26.604	0.013	<0.1%
Fe	72.142	71.920	0.052	<0.1%
P	0.012	0.011	0.001	8.3%
S	0.092	0.094	0.001	0.7%
As	0.104	0.1027	0.0004	0.4%

Conclusion

The NEX DE offers the lab analyst or at-line QC technician a simple and fast tool for measuring the Ni and Fe content, as well as the critical tramp elements P, S, and, As. Measurements are demonstrated here in vacuum environment; however, comparable results are also achieved using helium purge and the multi-position automatic sample changer.

Related products

NEX DE Series

High-power 60 kV EDXRF systems delivering speed, precisi
on, and small spot measurements