Performance Statement - Metal Alloys (Standardless Analysis) No. XSR-001

Analysis carried out using the X-ray Fluorescence technique of "Fundamental Parameters", often referred to as FP or Standardless analysis is a powerful, analytical technique offering rapid, simple, multi-element analysis using no, or minimal standards.

This technique complements the empirical calibration approach which requires the measurement of a series of well characterised calibration standards. Standardless can be used in many situations from simple confirmation of the presence of particular elements, to a full semi-quantitative/-quantitative analysis.

*The **X-Supreme**8000 uses the Fundamental Parameters (FP) technique (software option), and one example is the use of FP for metal analysis. In this case the requirement is to identify and quantify the main alloying elements, allowing confirmation of the alloy type.*

Material and Sample Preparation

A range of metal alloys, i.e Stainless steel and Nickel alloys were analysed using the **X-Supreme** "Metal FP" method.

The sample preparation requirement for metal analysis is to obtain a good surface free of any contamination or oxidation. This can normally be achieved by simple grinding the metal sample. This sample preparation is affordable, easy to use, and quick, resulting in a good analytical surface for XRF analysis.

Method

Method type: "Metal FP"
Spectrometer path: Air and helium
Total measurement time: Variable: from 100 to 600 seconds depending on requirements, that is from **rapid screening** to **full analysis**.

Typical Performance

Table 1: Stainless Steel

Main Elements Units	Al %	Si %	Ti %	V %	Cr %	Mn %	Fe %	Co %	Ni %	Cu %	Mo %
Given conc.	**0.09**	**0.73**	**0.60**	**0.11**	**17.84**	**1.58**	**67.97**	**0.23**	**10.02**	**0.33**	**0.27**
#1	0.12	1.06	0.69	0.10	17.88	1.69	67.86	0.09	9.78	0.28	0.27
#2	0.13	1.07	0.73	0.11	17.82	1.72	67.84	0.10	9.76	0.29	0.28
#3	0.11	1.07	0.68	0.10	17.87	1.67	67.96	0.08	9.76	0.28	0.27
#4	0.11	1.08	0.71	0.12	17.88	1.71	67.85	0.08	9.72	0.29	0.27
Average	**0.118**	**1.07**	**0.70**	**0.11**	**17.86**	**1.69**	**67.88**	**0.09**	**9.78**	**0.29**	**0.27**

One sample measured four times to show the high level or instrument repeatability.
Note: The use of one (type) stainless steel standard had been used to optimise performance.

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Table 2: Nickel Alloy

Main Elements	Cr	Mn	Fe	Co	Ni	Cu	Nb	Mo
Units	%	%	%	%	%	%	%	%
Given conc.	**21.71**	**0.55**	**18.54**	**1.15**	**48.13**	**0.26**	**0.35**	**8.74**
#1	21.35	0.62	18.51	0.72	48.5	0.29	0.31	8.49

Note: The use of one (type) Nickel standard had been used to optimise performance

Summary

A wide range of metal alloys can be analysed using the **X-Supreme**8000 "Metal FP" Fundamental Parameters method.

The Oxford Instruments method template "Metal FP" can be copied to generate methods for specific analytical requirements and/or matrix types. This high level of customisation, allows the FP method to be optimised for specific purposes, e.g. the addition or removal of certain elements, changes in analysis time, order of elements shown on display, use of specific type standards, etc.

The Standardless (Fundamental Parameters) analysis as used on the **X-Supreme**8000 offers the potential to measure a wide range of metal samples using little or no calibration standards.

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