

ABSTRACT

Quantitative analysis of C in Cast iron was performed using Xenemetrix EDXRF analyzer, model X-Calibur equipped with a highly sensitive Silicone Drift Detector for efficient detection of low molecular weight elements.

OBJECTIVE

To develop a quick and robust quantitative method for analysis of C in cast iron sample.

BACKGROUND

EDXRF is an ideal analytical technique for qualitative and quantitative elemental analysis. EDXRF poses many advantages: 1) non destructive technique, 2) samples are analyzed with minimal preparation, 3) simultaneous analysis of many elements, 4) quick technique; typical analysis time is usually a few minutes, 5) ease of use for non-technical stuff, 6) automated analysis process, 7) flexibility of sample form; sample may be solid, powder, liquid or thin film form.

These advantages have increased the popularity of XRF among industries such as chemicals, oil and alloys industries.

Analytical Configuration

Table 1: Instrumental analytical configuration

Instrument	X-Calibur
Anode	Rh-Anode X-ray Tube, 50kV, 50W
Detector	Light elements sensitive high performance Silicon Drift Detector (SDD)
Environment	Vacuum
Excitation mode	Direct excitation
Type of analysis	Quantitative analysis
Analysis time	300 sec
Sample Preparation	No sample preparation



EXPERIMENTAL and RESULTS

Cast iron sample was analyzed on X-Calibur for determination of Carbon content. No certified Cast iron calibration standards were provided for calibration of X-Calibur SDD analyzer. Therefore, the analyzer was calibrated with three certified calibration standards: IRAM27a, IRAM95D and PE. Calibration curve and calibration data are shown in figure 1 and table 1 respectively.

The result of the quantitative analysis of the Carbon content in the Cast iron sample is shown in figure 2.

Typical spectrum of C in Cast iron sample is shown in figure 3.

Figure 2: C calibration curve

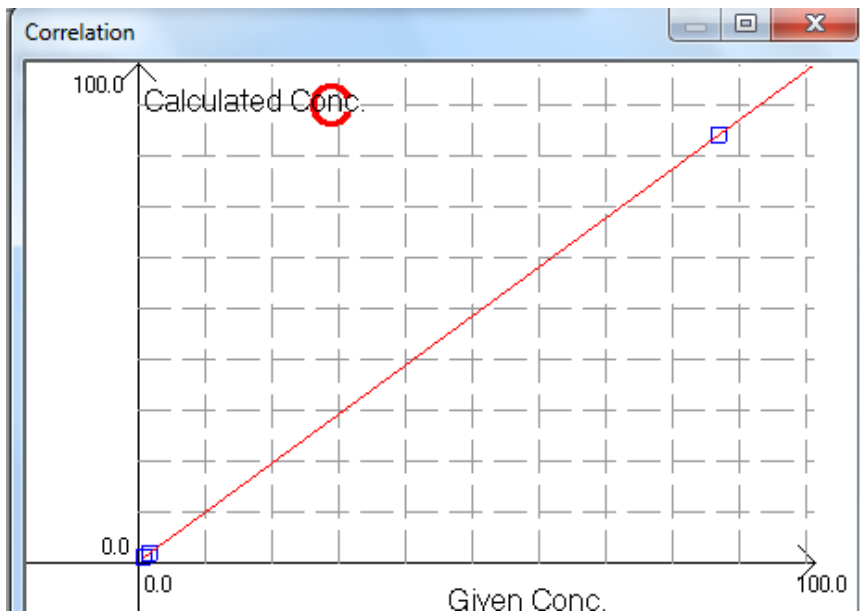


Table 2: Calibration data of C

Standard deviation= 0.0027 Correlation=1		
Standard ID	Given Conc. [w/w%]	Calculated Conc. [w/w%]
IRAM27A	0.002	0
IRAM95D	1.06	1.06
PE	85.7	85.7

Figure 2: C content in cast iron sample

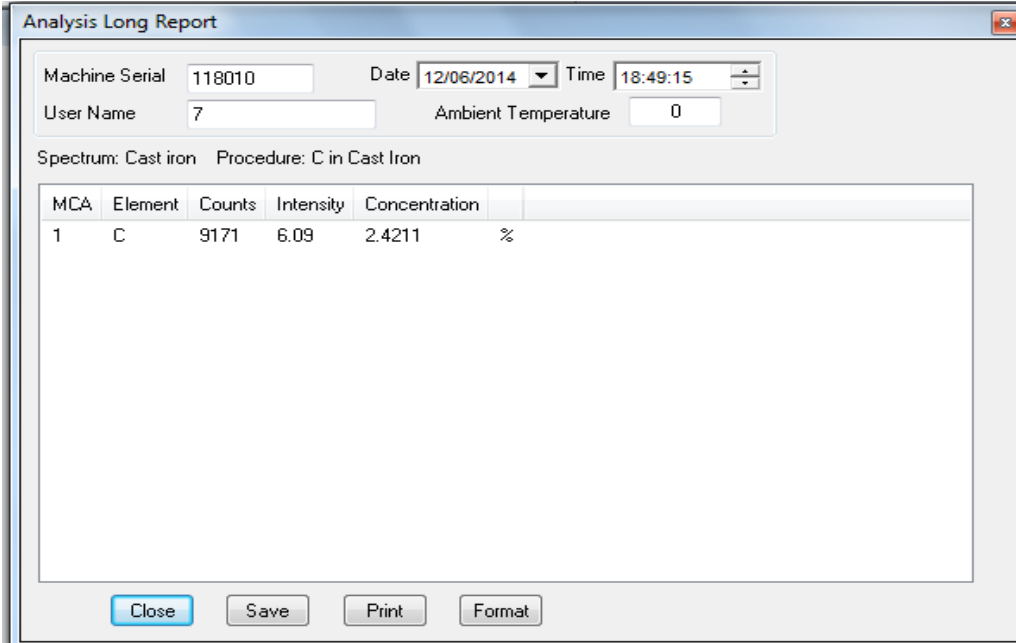
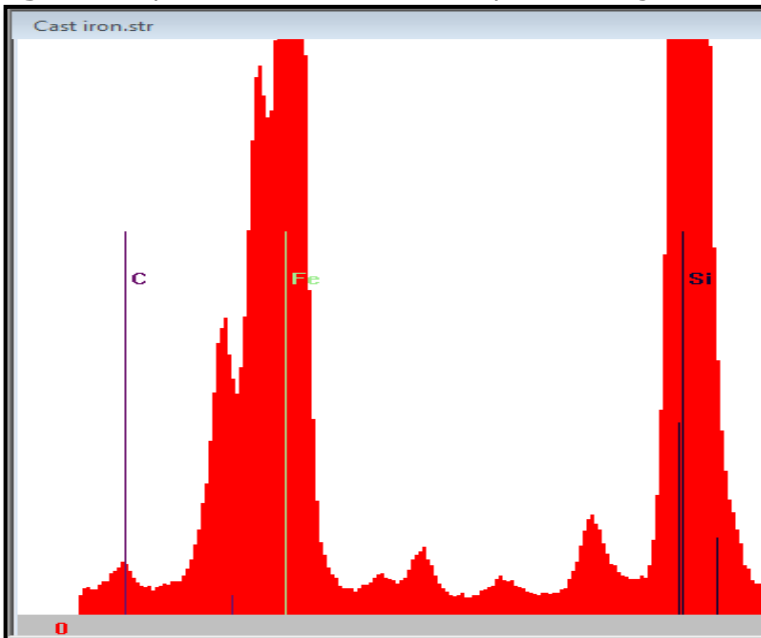


Figure 3: spectrum of Cast iron sample showing the Carbon peak



CONCLUSION

This work demonstrates the excellent performance of Xenemetrix X-Calibur analyzer equipped with a specially light element sensitive SDD detector for quantification of the carbon concentration in cast iron samples.