

Carbon detection and calibration

Introduction:

Carbon is known to be transparent for EDXRF. First intent was done here to evaluate novel detector with specialized polymer window to analyze carbon.

Goal

To establish calibration curve for carbon using carbon containing compounds.

Instrument

Xenemetrix made X-Calibur EDXRF analyzer with High resolution Silicon Drift Diode Detectors (SDD) with specialized polymer window instead of custom used Beryllium.

Fig 1: X-Calibur-SDD EDXRF



Sample acquisition was performed with low excitation energies without filters in vacuum; to eliminate absorption of the weak C signal by O₂ and N₂.

Fig 2: Overlaying Spectra of pure Carbon (blue) and Teflon (24% C) (red)

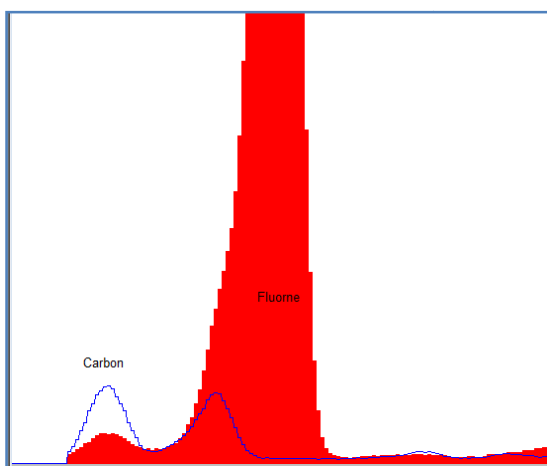


Fig 3: calibration curve for carbon

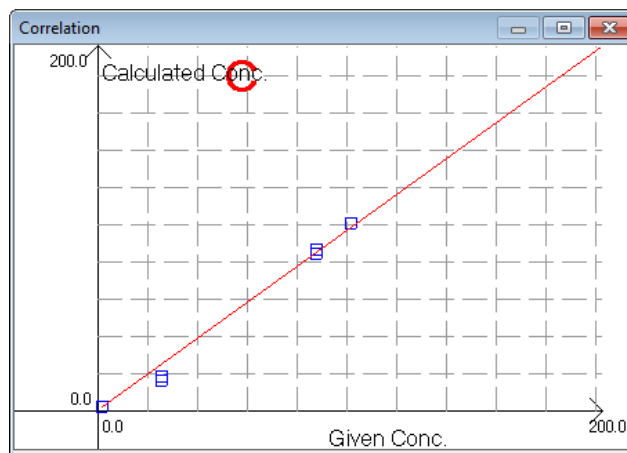


Table 1: Calibration data for C

Correlation: 0.9967 STD dev: 05.09		
STD ID	Given	Calculated
Pure carbon	100.0 %	102.2%
Polyethylene	85.7 %	85.3%
Teflon	24.0 %	17.1%
Li ₂ B ₄ O ₇	0 %	0%

Discussion

Preliminary work was done here to evaluate a novel detector for carbon; using standards of pure carbon, Teflon, Polyethylene and Carbon free substance Li₂B₄O₇.

The spectra of Teflon and Pure carbon (fig1) show the sensitivity of carbon down to 24% carbon content. Calibration curve with high prediction value is shown in table 2.

Conclusions

First intent was done here to analyze Carbon by EDXRF technology. This work shall be extended to lower concentration of carbon. This opens the door for EDXRF access to organic containing samples.