

EDXRF1846 - Analysis of Carbon Black



Scope

This application note uses [NEX DE](#) to demonstrate the analysis of carbon black, residual oil, and oil ash using semi-quant Fundamental Parameters (FP).

Background

Carbon black is made from coal tar and various petroleum tars from the cracking process. Carbon black is a crystalline form of carbon with very high surface area to volume ratio and is used mainly as a reinforcing filler in tires and used to strengthen engine hoses and gear belts. It is also used as copier toner inks and as pigment in polymers. The elemental characterization of the carbon black is critical to ensure proper quality of the various products. To meet this industry need, Applied Rigaku Technologies offers Energy Dispersive X-ray Fluorescence (EDXRF), ideal for the fast and simple analysis of carbon black and related products.

RPF-SQX semi-quant FP results

Sample I.D.: Carbon Black		
Component	NEX DE VS value	Stat. error
Na	ND*	0.05
Mg	ND*	0.006
Al	0.0539	0.0014
Si	(0.0029)*	0.0005

P	0.0375	0.0006
S	1.70	0.001
Cl	0.0015	0.0002
K	0.0344	0.0030
Ca	0.0202	0.0015
Ti	ND*	0.0003
V	ND*	0.0002
Cr	ND*	0.0001
Mn	ND*	<0.0001
Co	ND*	<0.0001
Fe	0.0042	<0.0001
Ni	ND*	<0.0001
Cu	(0.0001)*	<0.0001
Zn	ND*	<0.0001
Ga	ND*	<0.0001
Ge	ND*	<0.0001
As	ND*	<0.0001
Sr	<0.0001	<0.0001
Zr	ND*	<0.0001
Mo	(<0.0001)*	<0.0001
Cd	(<0.0001)*	<0.0001
Sn	ND*	<0.0001
Sb	ND*	<0.0001
Ba	(0.0009)*	0.0001
Ta	ND*	<0.0001
W	ND*	<0.0001
Pb	ND*	<0.0001
Bi	ND*	<0.0001
C	98.1	Balance

Sample I.D.: Residual Oil		
Component	NEX DE VS value	Stat. error

Na	ND*	0.088
Mg	ND*	0.008
Al	0.2	0.002
Si	0.131	0.001
P	0.0452	0.0005
S	1.09	0.001
Cl	0.0084	0.0001
K	ND*	0.003
Ca	ND*	0.001
Ti	ND*	0.0004
V	ND*	0.0002
Cr	ND*	0.0001
Mn	ND*	<0.0001
Fe	0.0015	<0.0001
Co	ND*	<0.0001
Ni	ND*	<0.0001
Cu	ND*	<0.0001
Zn	ND*	<0.0001
Ga	ND*	<0.0001
Ge	ND*	<0.0001
As	ND*	<0.0001
Sr	ND*	<0.0001
Zr	ND*	<0.0001
Mo	0.0002	<0.0001
Cd	ND*	<0.0001
Sn	ND*	<0.0001
Sb	ND*	<0.0001
Ba	(0.0012)*	0.0002
Ta	ND*	<0.0001
W	ND*	<0.0001
Pb	ND*	<0.0001
Bi	ND*	<0.0001

Oil	98.5	0.0007
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Sample I.D.: Oil Ash		
Component	NEX DE VS value	Stat. error
Na	ND*	0.0752
Mg	1.93	0.01
Al	23.9	0.01
Si	21.3	0.01
P	0.408	0.001
S	0.182	0.0005
Cl	0.0374	0.0004
K	(0.0438)*	0.0042
Ca	0.648	0.005
Ti	0.250	0.002
V	0.338	0.002
Cr	0.0824	0.0008
Mn	0.0236	0.0003
Fe	2.42	0.002
Co	0.0066	0.0004
Ni	0.129	0.0003
Cu	0.0096	<0.0001
Zn	0.0416	0.0001
Ga	0.0075	<0.0001
Ge	ND*	<0.0001
As	0.0011	<0.0001
Rb	0.0004	<0.0001
Sr	0.0146	0.0002
Y	0.0028	<0.0001

Sample I.D.: Oil Ash		
Component	NEX DE VS value	Stat. error
Zr	0.0051	<0.0001
Mo	0.0026	<0.0001

Sn	ND*	<0.0001
Sb	0.0052	<0.0001
Ba	0.0142	0.0002
La	0.155	0.0006
Ce	0.155	0.0007
Cd	ND*	<0.0001
Ta	ND*	0.0002
W	ND*	0.0001
Pb	0.0042	<0.0001
Bi	(0.0003)*	<0.0001
O	47.9	Balance

Conclusion

Innovative design using 60 kV tube and high-resolution, 500,000+ cps detector throughout provides sensitivity for trace measurements and low detection limits. Simple, intuitive software flow makes the NEX DE an ideal EDXRF tool for the elemental identification (Na – U), screening, and characterization of raw materials and final products. Simple to operate, the NEX DE is used by the non-technical operator and researcher alike.

Related products



NEX DE Series

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