Glass Composition Analysis

Major Constituents

Wavelength Dispersive X-ray Fluorescence (WD-XRF) can measure major and minor glass constituents.

Example: WD-XRF: Selected Compounds

SRM 93a borosilicate glass (wt%)		
	Measured	Actual
B2O3	12.00	12.56
Na2O	4.17	3.98
MgO	0.005	0.005
Al2O3	2.35	2.28
SiO2	81.3	80.8
Cl	0.078	0.060
K2O	0.016	0.014
CaO	0.016	0.01
TiO2	0.016	0.014
ZrO2	0.040	0.042

Trace Elements & Ultra-Trace Impurities

Inductively Coupled Plasma Mass Spectrometry (ICP-MS) measures low concentrations and trace level concentrations with high accuracy. ICP-MS. High Resolution- ICP-MS enables the analysis of impurities in quartz glass/sand down to ultra-trace levels.

Example: ICP-MS: Selected Elements

NIST 611 Trace Elements in Glass (ppm wt)		
	Measured	Actual
B	465	485
Na	10.2 wt%	10.2 wt%
Mg	483	465
Al	1.05 wt%	1.04 wt%
K	452	486
Fe	474	457
Co	413	405
Mo	359	377
Eu	477	461
Ta	391	377

Example: HR-ICP-MS: Selected Elements

	Limit of detection in quartz glass/ sand (ppm wt)
Al	0.2
Ca	0.2
Ce	0.02
Cr	0.05
Cu	0.02
Fe	0.1
Ge	0.02
K	0.2
Li	0.02
Mg	0.05
Mn	0.02
Mo	0.02
Ni	0.02
Na	0.2
Ti	0.02
W	0.05
Zn	0.2
Zr	0.02

Inclusions & Small Area

Laser Ablation ICP-MS (LA-ICP-MS) measures areas as small as 4 μm. Sampling depth ~1 μm.

Example: LA-ICP-MS: Selected Elements

NIST 611 Trace Elements in Glass (ppm wt)		
	Measured	Actual
B	474	485
Na	9.9 wt%	10.2 wt%
Mg	570	465
Al	1.10 wt%	1.04 wt%
K	483	486
Fe	456	457
Co	407	405
Mo	409	377
Eu	471	461
Ta	440	377

For more information about our glass analysis services, please visit eag.com/industry/glass/