

Measure Low Concentrations of As, Se and Pb in Water by MWDXRF

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As, Se and Pb are hazardous contaminants in wastewater discharges from industrial, mining and power generation facilities, potentially impacting drinking water drawn from connected natural waterways. Real time monitoring is required for remediation efforts and wastewater treatment to insure the integrity and safety of the water system. The EPA regulation of these elements have very low concentration thresholds: 10, 50, and 15 ppb for As, Se and Pb respectively, which is challenging for effective online measurement. Current techniques require substantial sample preparation with toxic reagents to approach the required detection thresholds. While traditional XRF technologies have been unable to reach the required detection limits, monochromatic excitation technology combined with the wavelength dispersive XRF method creates a monochromatic wavelength-dispersive XRF (MWDXRF) method capable of substantially lower limits of detection. A MWDXRF system has been developed to effectively detect ppb levels of a single metal, such as As, Se, or Pb in a water sample. The system is compact enough to be transportable, operates at low power, and provides non-destructive, pollution-free online testing suitable for use at drinking water and wastewater treatment facilities. This is the first demonstration of XRF technology applied for ppb-level detection of contaminants in water, and opens the exciting possibility of closed-loop sensing for improved control of water treatment.