

ANALYTICAL DETERMINATION OF SELENIUM IN MEDICAL SAMPLES, FOOD, AND DIETARY SUPPLEMENTS BY MEANS OF TOTAL REFLECTION X-RAY SPECTROSCOPY (TXRF)

Michael Beauchaine Bruker AXS Inc. Madison, WI
Hagen Stosnach Bruker AXS Microanalysis Berlin, Germany

Selenium is an essential element for animal health and thus the object to extensive medical research. This demands the use of analytical techniques that are capable of analyzing selenium at trace levels with small sample amounts in varying biological matrices.

In connection with the increased amount of research on selenium, there is a need for a rapid and simple-to-use on-site (or near site) analysis technique in food basics like wheat at processing and production plants, elemental determination in dietary supplements, and clinical applications for health and nutrition. Common analytical techniques like electrothermal atomic absorption spectroscopy (ETAAS) and inductively-coupled plasma mass spectrometry (ICP-MS) are capable of analyzing selenium in medical samples with detection limits in the range from 0.02 to 0.7 $\mu\text{g/l}$. Since many cases require less expensive and less complicated analytical techniques; TXRF has been tested for its suitability for selenium analysis in different medical, food basics, and dietary supplement samples applying simple sample preparation techniques.

The reported results indicate that the accuracy of selenium in a wide range of sample types is possible. The detection limits of TXRF are in the range from 7 to 12 $\mu\text{g/l}$ for medical samples and 0.1 to 0.2 mg/kg for food and dietary supplements. Although this sensitivity is low compared to the established techniques, it is sufficient for the physiological concentrations of selenium in the investigated samples.