

Determination of Trace Elements in Environmental Waters and Crude Oils Using Synchrotron Radiation Excited Total Reflection X-ray Fluorescence

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Abstract

Synchrotron radiation (SR) excited total reflection X-ray fluorescence analysis of trace elements in liquid samples was developed through examinations of sample preparation technique and quantification. The analytical method consisted of the deposition of 10 – 100 μ l quantities of the sample on a sample holder of high-quality, optically flat surface made of silicon. The sample was irradiated with a collimated, filtered beam of SR at a small incident angle so that total reflection took place at the sample holder surface.

The sample preparation and calibration procedures were simple. The quantitative analysis was carried out on 3 water samples (river, lake and drinking) and 32 crude oils. The elements determined were K, Ca, Mn and Fe for the waters and K, Ca, V, Cr, Fe, Co and Ni for the crude oils. Trace element determination in crude oil is regarded as very useful in geochemical oil-oil and oil-source rock correlation studies.

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