



Contribution ID: 197

Type: Verbal

Determination of fluorine in selected reference materials by instrumental photon activation analysis

Friday, 23 April 2010 03:00 (15 minutes)

Possibilities of nondestructive determination of fluorine in selected geological (coals, rocks) and biological reference materials by instrumental photon activation analysis (IPAA) using the MT 25 microtron have been studied. The determination has been based on counting of the non-specific 511 keV annihilation gamma rays of F-18, product of the photonuclear reaction $F-19(\gamma, n)F-18$ and a pure positron emitter. To eliminate production of C-11, irradiation was performed below the threshold energy of its formation, i.e., below 19 MeV. The determination was interfered by simultaneous formation of several other positron emitters, particularly Ti-45 and Cl-34m. Interference contributions from Na-22, Sc-44, Zr-89, As-74, and Rb-84 are small or negligible. By further optimization of beam energy and irradiation-decay-counting times and using correction standards for the interfering nuclides, IPAA allowed determination of fluorine in selected reference materials at the ten mg/kg level.

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Session Classification: Nuclear Analytical Methods 6

Track Classification: Nuclear Analytical Methods