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DETERMINATION OF 129I BY ACCELERATOR MASS SPECTROMETRY IN FORENSIC ANALYSIS

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The nuclear forensic analysis deals with tracing the origin of nuclear materials found outside the regulatory control. Each material contains a different amount and type of radionuclides that are characteristic of each type of material. This unique composition and characteristic parameters are used to identify unknown samples. They are referred to as "fingerprints"due to their uniqueness.

Nowadays, ^{129}I is one of the most observed isotopes of iodine in the environment. The main part of ^{129}I in the environment comes from nuclear power plants, leakage from spent nuclear fuel reprocessing facilities, from nuclear weapon tests, from nuclear accidents. It can be used for age dating, as an oceanic tracer, for water mass exchange monitoring, for research of the geochemical cycle of stable iodine.

Iodine exists in nature mainly in trace amounts, so it is necessary to separate and pre-concentrate it from the samples before measuring. The separation of iodine itself is a difficult task, as it is a volatile form of iodine. Three methods are the most commonly used for solid sample preparation –alkaline leaching, acid digestion, and combustion. All methods are time-consuming and require special instrumentation or chemicals. For this purpose, there is a goal to find a new, simple, and fast technique for iodine sample preparation from solid matrices.

There are many methods available for iodine determination. The most used and most accurate ones are low energy gamma-ray spectrometry, liquid scintillation counting, inductively coupled plasma mass spectrometry, and accelerator mass spectrometry. AMS is the most used method for the determination of trace amounts of iodine in the samples. It can detect an isotopic ratio of ^{129}I/^{127}I in order of magnitude 10^{-15}. As a part of the RAMSES project, new laboratory with MILEA-type AMS was built in Řež, on which the samples will be measured.

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