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New analytical procedures for the determination of chosen radionuclides by ICP-MS for nuclear forensic purposes.

Nuclear Forensics is defined as the examination of nuclear or other radioactive material, or of evidence that is contaminated (or comingled with) radionuclides, in the context of legal proceedings under international or national laws related to nuclear security [1]. The goal of nuclear material forensics is to establish an unambiguous link between man-made nuclear materials and their intended use, means of processing, point of origin, and routes of transport [2]. Forensic analysis of interdicted nuclear material relies on a wide variety of analytical techniques to establish material provenance, history, and intended use. Taking into account the number of publications on nuclear forensics, which appeared in the last years, it can be concluded that there are still new challenges in this area. The list of analytical techniques which can be used for nuclear material characterization and the obtained corresponding information from each technique is given in [3]. The main goal of this work is to show the possibility of quadrupole ICP-MS (Q-ICP-MS) using for the determinations of isotopic ratios (IR) of U. Usually, for this purpose the high resolution spectrometers are used. Their price is much higher than the standard quadrupole spectrometers, their purchase is not always possible (especially for the developing countries). Radionuclides are present at low concentration levels, so to determine them with high accuracy (to improve the sensitivity and to obtain lower detection limits), the appropriate preconcentration and separation steps should be introduced to the analytical schemes. In this work, using chelating ion-exchangers is proposed.

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