Radioanalytical Chemistry, present status and challenge

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Radioanalytical chemistry of radionuclides is the most basic aspects in many aspects of nuclear industry, environmental monitoring, nuclear safety and tracing studies of environmental process. This work summarize the status and progress of materials and techniques developed for the separation of radionuclides, including extraction chromatographic resins, adsorption materials for gaseous and hard-to-measure radionuclides, scintillation resin for on-line determination of radionuclides. The development on instruments and methods for measurement radionuclides are also summarized, including the methods for measure ultra low-level radionuclides and rapid, automated, and on-line measurement techniques. The efforts to achieving an online and in-situ analysis of radionuclides in reprocessing process and influents from nuclear facilities nuclear power plants and medical radioisotope production laboratories are highlighted. These efforts include synthesis and production of various separation materials for specific separation of different radionuclides from various media including atmosphere, acidic and alkaline effluent, as well as scintillation resin for direct separation of target radionuclides for direct measurement by scintillation counter; establishment of various separation methods specific separation of target radionuclides from complicated matrices and sequential separation of a series radionuclides from the same sample; design and establish separation system based on flow injection concept to fulfil automated separation of radionuclides; integrate detection and control systems with automated separation and scintillation separation material to achieving automated, on-line, even in-situ determination of radionuclides. Meanwhile, a comparison on the radiometric technique and mass spectrometric techniques for measurement of long-lived radionuclides are compared. The new challenge on the separation and determination of radionuclides, and the corresponding strategies are also discussion.

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