

Neutron activation analysis in environmental studies

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In spite of competing non-nuclear analytical techniques (AAS, ICP-ES, ICP-MS, etc), reactor neutron activation analysis is continuing to be a most powerful multi-element analytical technique used in geosciences, environmental sciences and material sciences. Radioanalytical complex REGATA at the IBR-2 reactor for more than 30 years of operation has become a source of analytical data for a considerable number of international projects carried out with specialists from JINR member- and non-member states. The results obtained in Dubna are reported to the European Atlas of «Atmospheric deposition of heavy metals in Europe - estimates on the basis of the analysis of mosses» edited each 5 years under the aegis of the UNO Commission of transboundary transport of atmospheric deposition in Europe (UNECE ICP Vegetation. The other scientific directions of applying NAA in environmental studies is water quality monitoring, development of the techniques of water treatment, assessment of the quality of soil and geological samples, nanotoxicology.

Tasks

1. Introduction in neutron activation analysis
2. Processing of gamma spectra using GENIE 2000 software
3. Data processing using Statistica and Origin software

Preliminary schedule by topics/tasks

The duration of this project is 4 weeks.

Week 1 – introduction lectures, reading the articles

Week 2 – samples preparation for analysis, gamma spectra processing

Week 3 – data processing

Week 4 – preparation of the report

Required skills

Obligatory: general physics, general chemistry, course on nuclear physics; fluent English and good knowledge in computing (EXCEL, STATISTICA, ORIGIN)

Desireably: practicum on experimental nuclear physics (practicum), gamma-spectrometry,

Course of general ecology (Earth Sciences), course of environmental chemistry, basic knowledge in soil sciences, statistical methods of data processing.

Acquired skills and experience

1. New knowledge about neutron activation analysis
2. New skills in gamma spectra processing
3. Experience in data processing

Recommended literature

Students will be provided with necessary literature