

Introduction of the k_0 -INAA method to the research workshop of the MARIA Research Reactor

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The k_0 -standardization method in Instrumental Neutron Activation Analysis (k_0 -INAA) is a highly sensitive, non-destructive technique for multi-elemental trace analysis, with significant applications in environmental radioactivity studies, particularly for quantifying uranium (U) and thorium (Th) in exploration rock samples. By employing a single comparator, typically gold, and utilizing well-characterized neutron flux parameters and nuclear constants (k_0 -factors), k_0 -INAA enables precise determination of radionuclide and trace element concentrations without multi-elemental standards. Its robustness makes it ideal for analyzing complex environmental matrices such as soils, sediments, and rocks to assess radioactive contamination. k_0 -INAA enables accurate multi-element and radionuclide analysis, including Cs-137, U and Th¹. Combining k_0 -INAA with the IENAA (Instrumental Epithermal Neutron Activation Analysis) technique allows for the determination of U and Th concentrations in exploration rock samples². The k_0 -INAA method's minimal sample preparation reduces contamination risks and eliminates corrosive reagents, unlike ICP-MS³. Available software like k_0 -IAEA for Windows enhances automation, facilitating large-scale studies. The k_0 -INAA method remains essential for environmental research, providing critical data for pollution monitoring and regulatory compliance.

The laboratory is focusing on introducing this method and building team capabilities. In future, the k_0 -INAA technique will be used to analyze air particulate, marine environmental samples, geological samples.

References (for context, not included in abstract word count):

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