31st International Seminar on Interaction of Neutrons with Nuclei: Fundamental Interactions & Neutrons, Nuclear Structure, Ultracold Neutrons, Related Topics (ISINN-31)



Contribution ID: 100

Type: not specified

Measurement of Arsenic Contamination in Soil and Groundwater in Pabna, Bangladesh, Using JINR FLNP Neutron-Producing Facilities

In regions such as Pabna, Bangladesh, where groundwater is the primary source of drinking water, arsenic contamination in both soil and groundwater poses a significant threat to human health.

Neutron Activation Analysis (NAA) is a highly sensitive and precise analytical technique capable of detecting and quantifying trace levels of arsenic, even at concentrations as low as parts per billion (ppb). This method allows for the assessment of both total and bioavailable arsenic fractions in soil samples, as well as analysis of dissolved arsenic in groundwater samples. The World Health Organization (WHO) has established a guideline threshold of 10 µg/L for arsenic concentrations in drinking water, which serves as a critical benchmark for evaluating contamination levels in affected environments.

Arsenic concentrations in soils are expected to exhibit significant spatial variability, with elevated levels likely in areas historically subjected to intensive agricultural practices and irrigation using arsenic-contaminated groundwater. This report emphasizes the urgent need for immediate mitigation strategies, including the development of alternative water sources and the implementation of soil remediation techniques, to address the widespread arsenic contamination in Pabna. Additionally, it highlights the severe health risks associated with prolonged exposure to arsenic.

Neutron Activation Analysis (NAA) conducted at the IBR-2 reactor or the IREN facility at the Frank Laboratory for Neutron Physics, Joint Institute for Nuclear Research (JINR), Dubna, Russia has proven to be a highly effective technique for analyzing the elemental composition of environmental samples. This method is proposed for assessing arsenic contamination levels in affected regions.

The findings from this research will contribute to initiatives aimed at ensuring access to clean drinking water and promoting sustainable agricultural practices. Furthermore, this study will enhance the existing understanding of arsenic pollution in Bangladesh and support efforts to mitigate its impact on public health and the environment.

Keywords: Neutron Activation Analysis (NAA), IBR-2 reactor, IREN facility, Arsenic contamination, ground-water, soil samples.

Primary author: DAS, Pretam Kumar (Pabna University of Science and Technology, Pabna-6600, Bangladesh)

Presenter: DAS, Pretam Kumar (Pabna University of Science and Technology, Pabna-6600, Bangladesh)

Session Classification: Poster Session

Track Classification: Poster session