

## **A SIMPLE, RAPID AND ECO FRIENDLY DECOMPOSITION METHOD FOR LOW SILICATE GEOLOGICAL SAMPLES AND DETERMINATION OF URANIUM BY ICP-OES**

V. V. Hanuman<sup>1\*</sup>, A. K. Singh<sup>2</sup> and G. Chakrapani<sup>1</sup>

*1 Chemistry Laboratory, Atomic Minerals Directorate for Exploration and Research, Hyderabad*

*2 Chemistry Laboratory, Atomic Minerals Directorate for Exploration and Research, NER, Shillong*

*E-mail: vv\_hanuman@rediffmail.com*

### **Abstract**

A simple, rapid, cost effective and eco friendly decomposition and dissolution method is developed for the determination of uranium (U<sub>3</sub>O<sub>8</sub>) by Inductively Coupled Plasma – Optical Emission Spectrometer (ICP-OES) in low silicate geological samples. The salts of Sodium di-hydrogen phosphate monohydrate and Tetra sodium pyrophosphate deca hydrate are used in the ratio of 1:1 (phosphate flux) for the decomposition of geological samples having low silica content. Samples are decomposed by fusion with the phosphate flux after ignition and dissolved in distilled water. Samples contain >10% silica, have been treated with little amount of HF and HNO<sub>3</sub>, prior to fusion with phosphate flux. These samples are analysed by ICP-OES directly without any separation from the matrix. The spectral interferences of major matrix elements (Al, Ti, Fe, Mn, etc present in the sample) on uranium are studied and no significant interferences are observed, as dilution is required to bring uranium concentration into calibration range of instrument.

The accuracy and precision of the method was evaluated by analyzing Certified Reference Materials (BL-5 of CANMET, CANADA) and Synthetic samples. The accuracy of the data is further evaluated by comparing the proposed method with the reported sample solution preparation method. The results are in good agreement. The RSD of the method is <1.0% (n=5) at 10.0% U<sub>3</sub>O<sub>8</sub>. The method is applied to geological samples of low silica content received from Mahadek Basin Investigations of Meghalaya, India for determination of uranium.

Keywords: Uranium, Geological samples, Phosphate flux, Mahadek Basin Investigations, ICP-OES.