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Rapid Method to Determine Plutonium, Neptunium, Americium and Curium in Granite Samples

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Abstract

A fast method for determination of plutonium, neptunium, americium and curium isotopes in granite has been developed for use following a radiological event. Granite samples are fused with sodium hydroxide to achieve complete dissolution, critical if refractory particles are present. Rapid precipitation steps are utilized to preconcentrate the actinide isotopes and remove sample matrix interferences. Plutonium, neptunium, and americium/curium are separated using innovative extraction chromatography and measured by alpha spectrometry. The sample preparation time is less than four hours.

Introduction

Granite is a construction material for many important buildings in the United States, including the U.S. Treasury Building and the Vietnam Memorial in Washington, DC. It has also been employed as an important building material for skyscrapers and monuments throughout the world. If a radiological event such as a radiological dispersive device (RDD), an improvised nuclear device (IND) or a nuclear accident occurs, then there will be hundreds of thousands of environmental and bioassay samples to analyze over a recovery period of approximately one year or more. Rose et al. (2015) note that if an IND detonation occurs that as part of a disaster

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