EPA issues additional rapid radiochemical response methods that incorporate Eichrom resins

In July, the United States Environmental Protection Agency (U.S. EPA) released a second edition of the *Rapid Radiochemical Methods for Selected Radionuclides in Water, Air Particulate Filters and Swipes, and Soil Matrices for Environmental Remediation Following Radiological Incidents*. This publication expands the scope from the first edition, titled *Rapid Radiochemical Methods for Selected Radionuclides in Water for Environmental Restoration Following Homeland Security Events.* The new suite incorporates 12 methods for the determination of nine radionuclides in four sample matrices.

As specified in the title, this addition adds procedures for the digestion of air filters and swipes as well as soil dissolution for the determination of radionuclides. The nuclides covered by these methods include Am-241, Pu-238 and Pu-239, P-32, Sr-90, Ra-226 and Isotopic Uranium. For each matrix there are well tested methods for preparing the various sample matrices for chemical separation and purification via Eichrom resin systems.

The sample preparation methods and radionuclide separation methods were developed to work together to rapidly prepare a sample aliquot for analysis. The addition of filter and soil dissolution techniques to the water methodologies enhances the resources available to the environmental testing community to address rapid sample analysis.

In this second publication from the U.S. EPA, two methods are presented for the preparation of air filters for analysis. In EPA 402-R-12-009, filters and smear samples are rapidly digested after ashing of organic filters with a combination of acids. The EPA method 402-R-12-008 utilizes a sodium carbonate fusion to prepare the filters for additional chemical separation. The reason for the two methods is explained in the scope and application section: *Generally, the sodium carbonate fusion techniques should be chosen when refractory constituents are suspected in the sampled particulates or when the acidic digestion procedure is otherwise deemed to be ineffective*.

Likewise, this publication from the U.S. EPA includes three methods for the fusion of soil samples. However, in this case, the variations in fusion technique are based on target radionuclide and not refractory constituents in the sample matrix. Each of the above preparation methods makes the sample appropriate for chemical separation and analysis according to the rapid radionuclide water methods included in the second edition. Laboratories are also encouraged to review other recent publications as much work has been done across the industry in recent years to develop rapid soil and solids preparation procedures.

This publication also includes a method for the determination of phosphorous-32 in water samples. This method utilizes a combination of cation and Diphonix® resins to concentrate the sample and then purify the sample fraction for analysis. The method selected for analysis uses the technique of Cherenkov counting to only count the strong beta emission from P-32 and reject the weak beta emission from P-33 that might be present in the initial sample.

The methods have been developed at the National Analytical Radiation Environmental Laboratory (NAREL). NAREL is a comprehensive environmental laboratory managed by the U.S. Environmental Protection Agency's Office of Radiation and Indoor Air (ORIA) located in Montgomery, AL. The methods can be downloaded from the U.S. EPA website at: http://www.epa.gov/narel/rapid_methods.html.

The preface to these methods contains additional information regarding method selection, application and recommendations. The preface also makes the note that additional methods are being developed for the determination of radionuclides in matrices such as concrete and brick, building materials, and RTG materials.

You are encouraged to download and review these methods for ways your laboratory can streamline and improve sample digestion and separation techniques.

For additional questions regarding these specific methods, please contact:

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