September 2014 Update: EPA has validated and published a rapid method for building material matrices for analysis of americium-241. The method is summarized and accessible through the link provided below.

Rapid Radiochemical Method for Americium-241 in Building Materials for Environmental Remediation Following Radiological Incidents

Analyte(s)	CAS RN
Americium-241	14596-10-2

Analysis Purpose: Qualitative analysis
Technique: Alpha spectrometry

Method Developed for: Americium-241 in building materials
Method Selected for: SAM lists this method for qualitative analysis of americium-241 in concrete or brick building materials

Description of Method: This method is based on the use of extraction chromatography resins (TEVA® and DGA® resins) to isolate and purify americium by removing interfering radionuclides as well as other matrix components in order to prepare the americium fraction for counting by alpha spectrometry. The method utilizes vacuum-assisted flow to improve the speed of the separations. The sample may be fused using "Rapid Method for Sodium Hydroxide Fusion of Concrete and Brick Matrices Prior to Americium, Plutonium, Strontium, Radium, and Uranium Analyses" Revision 0, EPA 402-R14-004 (Reference 16.5 of the method), and the americium isotopes removed from the fusion matrix using iron hydroxide and lanthanum fluoride precipitation steps. Americium-243 tracer, added to the sample, is used as a yield monitor. The sample test source (STS) is prepared by microprecipitation with cerium (III) fluoride.

The method is capable of achieving a required method uncertainty for Am-241 of 0.20 pCi/g at an analytical action level of 1.5 pCi/g. To attain the stated measurement quality objectives (MQOs) a sample weight of approximately 1 g and count time of at least 4 hours are recommended

Special Considerations: Alpha-emitting radionuclides with irresolvable alpha energies, such as plutonium-238 (5.50 MeV) and thorium-228 (5.42 MeV) can interfere with measurement of americium-241, and must be chemically separated to enable measurement. This method separates these radionuclides effectively. The significance of peak overlap will be determined by the individual detector's alpha energy resolution characteristics and the quality of the final precipitate that is counted. A thorium removal rinse is performed on DGA® resin in the event that any thorium ions pass through TEVA® resin onto DGA® resin. Vacuum box lid and holes must be cleaned frequently to prevent cross-contamination of samples. A dilute nitric acid rinse is performed on DGA® resin to remove calcium and lanthanum ions which could end up on the final alpha source filter as fluoride solids. This volume may be increased slightly to better remove calcium and lanthanum ions and possibly improve alpha peak resolution, but this will have to be validated by the laboratory. Non-radiological interferences include anions that can complex americium, such as fluoride and phosphate, and lead to lower yields. Boric acid added in the load solution complexes fluoride ions while aluminum complexes both fluoride as well as any residual phosphate that may be present. High levels of calcium can have an adverse impact on americium retention on DGA® resin. This interference is minimized by increasing the nitrate concentration to lower calcium retention and increase americium affinity on DGA® resin.

Source: U.S. EPA, National Air and Radiation Environmental Laboratory (NAREL). April 2014. Rev 0 "Rapid Radiochemical Method for Americium-241 in Building Materials for Environmental Remediation Following Radiological Incidents," EPA 402-R14-007.
http://www2.epa.gov/radiation/rapid-radiochemical-methods-selected-radionuclides