

## Rapid Radiochemical Method Strontium-90 (<sup>90</sup>Sr) in Water Samples



EPA's rapid radiochemical methods expedite analytical turnaround time for selected radionuclides while providing quantitative results that meet measurement quality objectives. Methods are applicable to samples where contamination is from either known or unknown origins. This fact sheet is intended for radioanalytical laboratory personnel, decision makers within the incident command structure, additional reoccupancy decision makers (e.g., state and local public health), and other field environmental response personnel.

**Method Summary:** Strontium is isolated from the matrix and purified from potentially interfering radionuclides and matrix constituents using a strontium-specific, rapid chemical separation method. The sample is equilibrated with strontium carrier, and concentrated by strontium/barium carbonate coprecipitation. If insoluble residues are noted during acid dissolution steps, the residue and precipitate mixture is digested in nitric acid to solubilize strontium. The solution is passed through a strontium specific resin extraction chromatography column. The sample test source is promptly counted on a gas flow proportional counter to determine the beta emission rate, which is used to calculate the total radiostrontium activity.

<p><b>Time to Process: 8.7 hr</b></p> <p>Includes radiochemical processing and counting</p> <p>Compare to traditional method (EPA 905.0): 25–28 hr</p>
<p><b>Measurement Quality Objectives</b></p> <p>Required method uncertainty: 1.0 pCi/L          Analytical action level (AAL): 8 pCi/L          Required relative uncertainty: 13% above AAL          Minimum detectable concentration: 1.5 pCi/L          Sample quantity: ~ 500 mL          Count time: ~ 1.25 hr</p>
<p><b>Sample Preservation</b></p> <p>Samples should be collected in 1 L plastic containers          Analysis within 3 days of sampling: No preservation required          Holding time &gt;3 days: Adjust pH to &lt;2 with concentrated nitric acid</p>
<p><b>Waste Generated per Sample</b></p> <p>Nitric acid          Hydrochloric acid          mg/mL levels of barium in initial column effluents          Radiostrontium contained in final precipitated materials          Used resins and columns should be considered radioactive waste</p>
<p><b>Method Access:</b> <a href="https://www.epa.gov/sites/production/files/2015-06/documents/sr-90_in_water_rev_0_1_epa_402-r-10-001d.pdf">https://www.epa.gov/sites/production/files/2015-06/documents/sr-90_in_water_rev_0_1_epa_402-r-10-001d.pdf</a></p>

<p><b>Method Application</b></p> <p>The method provides a very rapid non-radioisotope-specific screen for total radiostrontium in drinking water and other aqueous samples. Application of this method should be validated by the laboratory using the protocols provided in <a href="#">Method Validation Guide for Qualifying Methods Used by Radiological Laboratories Participating in Incident Response Activities</a>, or the protocols published by a recognized standards organization for method validation.</p>
<p><b>Equipment and Supplies</b></p> <p><b>Analytical balance:</b> 10<sup>-4</sup> g readability or better   <b>Centrifuge</b> able to accommodate 250 mL flasks and 50 mL centrifuge tubes   <b>Centrifuge flasks:</b> 250 mL, disposable   <b>Centrifuge tubes:</b> 50 mL, disposable   <b>Low-background gas flow proportional counter</b>   <b>Laboratory supplies:</b> pH paper; stainless steel planchets or other sample mounts, ~ 2 inch diameter   <b>Vacuum system:</b> box; pump or laboratory system; white inner tips; yellow outer tips</p>

### Contacts

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