

Summary of Method A method for the preparation of ⁹⁰Y ($t_{1/2} = 64.1$ hours) from ⁹⁰Sr ($t_{1/2} = 28.6$ years) source material is presented. The method employs 2mL cartridges of Sr and DGA resins to obtain high purity ⁹⁰Y in small volumes of eluate while preserving valuable ⁹⁰Sr source material. The source material, containing ⁹⁰Sr/⁹⁰Y, in 4M HNO₃, is loaded onto stacked 2mL cartridges of Sr and DGA resins. ⁹⁰Sr is retained on Sr Resin, while ⁹⁰Y is retained on DGA. The ⁹⁰Sr source is recovered from Sr Resin with a small volume of 0.1M HCl. Following a suitable ingrowth period, the ⁹⁰Sr can be acidified to 4M HNO₃ and used to produce additional ⁹⁰Y. The ⁹⁰Sr is preserved nearly indefinitely and continuously purified from chemical and radiologic impurities run to run. ⁹⁰Y is recovered from DGA resin with 0.1M HCl. For applications where ⁹⁰Y must be recovered in minimal volumes, DGA, Branched may be used in place of DGA, Normal.

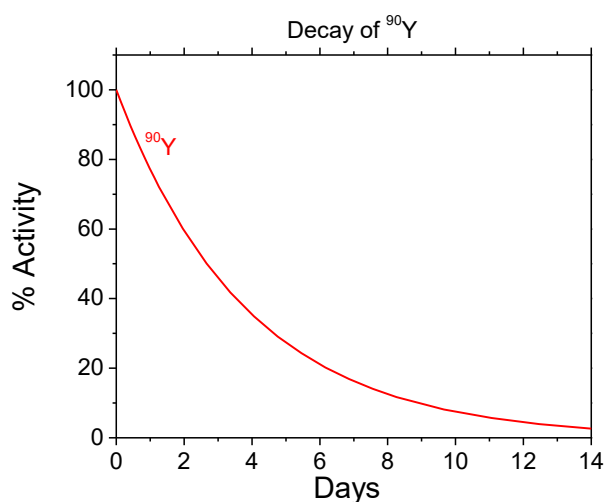
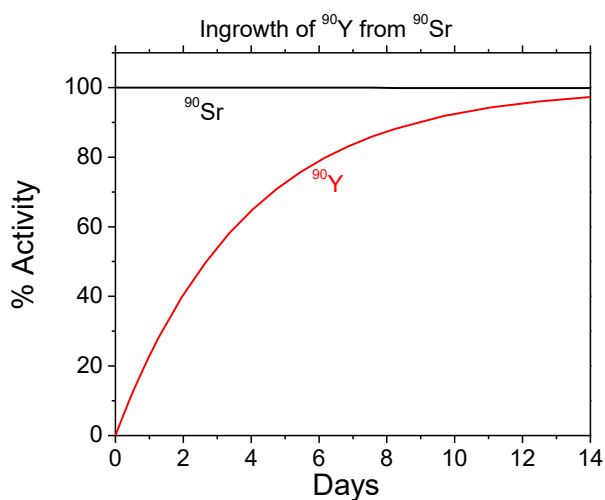
Reagents

- Sr Resin Cartridges (Eichrom SR-R50-S)
- DGA, Normal Resin Cartridges (Eichrom DN-R50-S) or DGA, Branched Resin Cartridges (Eichrom DB-R50-S)
- Liquid Scintillation Cocktail
- ⁹⁰Sr Source
- Deionized Water
- HCl
- HNO₃

Equipment

- Glass vials for storage of ⁹⁰Sr source.
- Glass or plastic vials/bottles for collection of ⁹⁰Y and waste.
- 5, 10 or 20mL plastic luer lock syringes
- Liquid Scintillation system for measurement of ⁹⁰Sr and ⁹⁰Y.*

*⁹⁰Y may also be measured by Cerenkov counting without the addition of scintillation cocktail.



⁹⁰Sr/⁹⁰ Separation

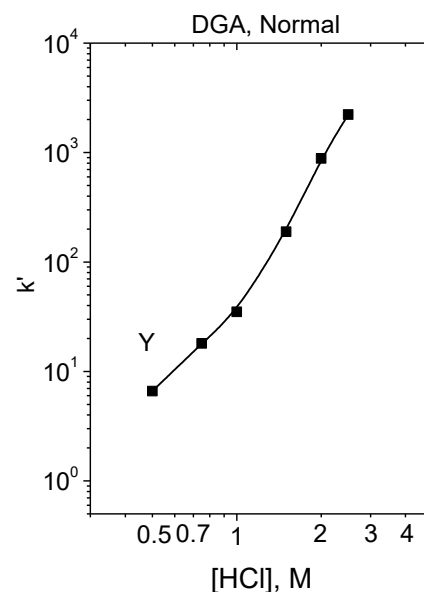
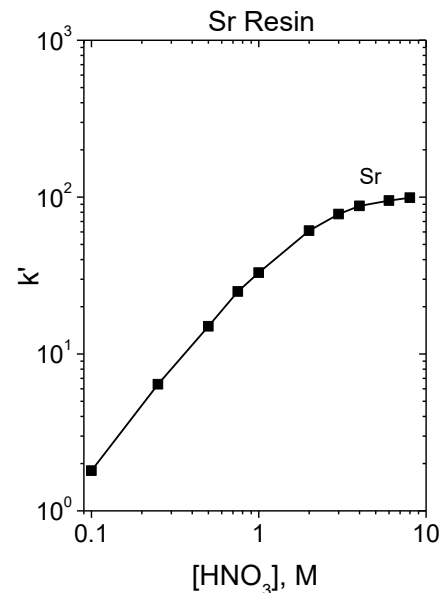
- (1) Precondition stacked 2mL cartridges of Sr and DGA Resins with 10mL 4M HNO₃.
- (2) Acidify ⁹⁰Sr eluate from previous separation with 5mL conc. HNO₃. (If new ⁹⁰Sr source, dilute to 20mL with 4M HNO₃.)*
- (3) Load ⁹⁰Sr and ⁹⁰Y in 20mL 4M HNO₃.
- (4) Rinse Sr/DGA with 5mL 4M HNO₃.
- (5) Separate Sr and DGA cartridges.
- (6) Place DGA cartridge above Sr resin cartridge.



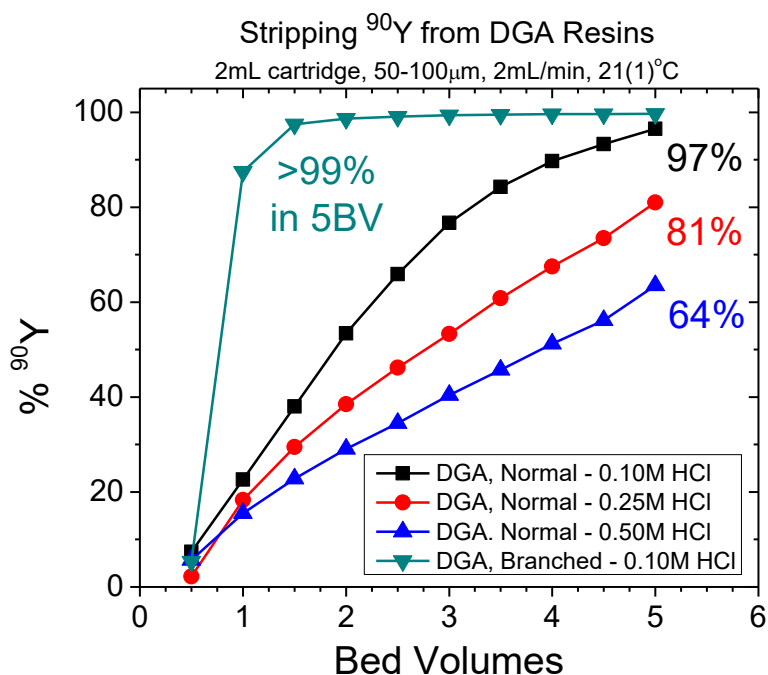
- (7) Strip ⁹⁰Sr from DGA/Sr resin cartridges with 15mL 2M HCl. Save ⁹⁰Sr for future use.



- (8) Remove Sr resin cartridge.
- (9) Strip ⁹⁰Y with 10mL 0.1M HCl.



*Adding 1mg of stable Sr to the ⁹⁰Sr source can help improve ⁹⁰Sr recovery from Sr Resin (do only once, not each time).



References

- 1) McAlister and Horwitz, "Chromatographic Generator Systems for the actinides and natural decay series elements," *Radiochimica Acta*, 99:1-9 (2011).