

**Summary of Method** A method for the preparation of  $^{90}\text{Y}$  ( $t_{1/2} = 64.1$  hours) from  $^{90}\text{Sr}$  ( $t_{1/2} = 28.6$  years) source material is presented. The method employs 2mL cartridges of Sr and DGA resins to obtain high purity  $^{90}\text{Y}$  in small volumes of eluate while preserving valuable  $^{90}\text{Sr}$  source material. The source material, containing  $^{90}\text{Sr}/^{90}\text{Y}$ , in 4M  $\text{HNO}_3$ , is loaded onto stacked 2mL cartridges of Sr and DGA resins.  $^{90}\text{Sr}$  is retained on Sr Resin, while  $^{90}\text{Y}$  is retained on DGA. The  $^{90}\text{Sr}$  source is recovered from Sr Resin with a small volume of 0.1M HCl. Following a suitable ingrowth period, the  $^{90}\text{Sr}$  can be acidified to 4M  $\text{HNO}_3$  and used to produce additional  $^{90}\text{Y}$ . The  $^{90}\text{Sr}$  is preserved nearly indefinitely and continuously purified from chemical and radiologic impurities run to run.  $^{90}\text{Y}$  is recovered from DGA resin with 0.1M HCl. For applications where  $^{90}\text{Y}$  must be recovered in minimal volumes, DGA, Branched may be used in place of DGA, Normal.

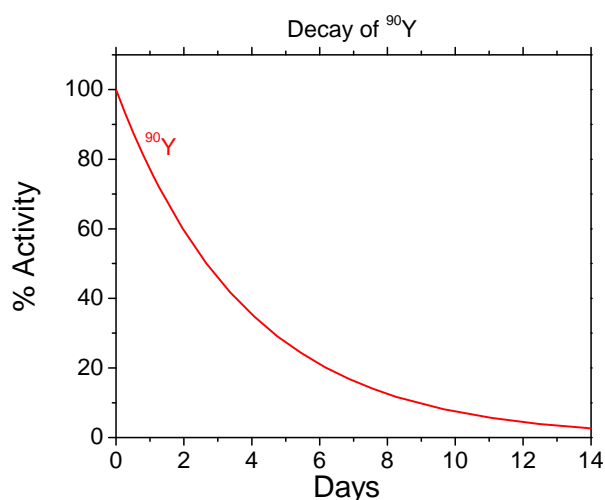
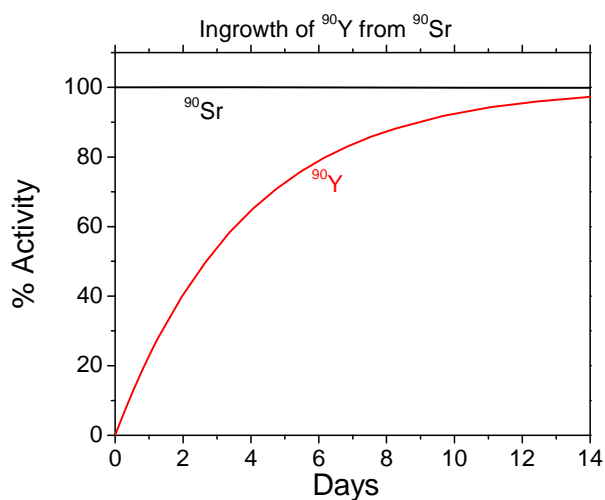
## Reagents

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  
 $^{90}\text{Sr}$  Source  
 Deionized Water  
 HCl  
 $\text{HNO}_3$

## Equipment

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

\* $^{90}\text{Y}$  may also be measured by Cerenkov counting without the addition of scintillation cocktail.



## <sup>90</sup>Sr/<sup>90</sup> Separation

(1) Precondition stacked 2mL cartridges of Sr and DGA Resins with 10mL 4M HNO<sub>3</sub>.

(2) Acidify <sup>90</sup>Sr eluate from previous separation with 5mL conc. HNO<sub>3</sub>. (If new <sup>90</sup>Sr source, dilute to 20mL with 4M HNO<sub>3</sub>.)\*

(3) Load <sup>90</sup>Sr and <sup>90</sup>Y in 20mL 4M HNO<sub>3</sub>.

(4) Rinse Sr/DGA with 5mL 4M HNO<sub>3</sub>.

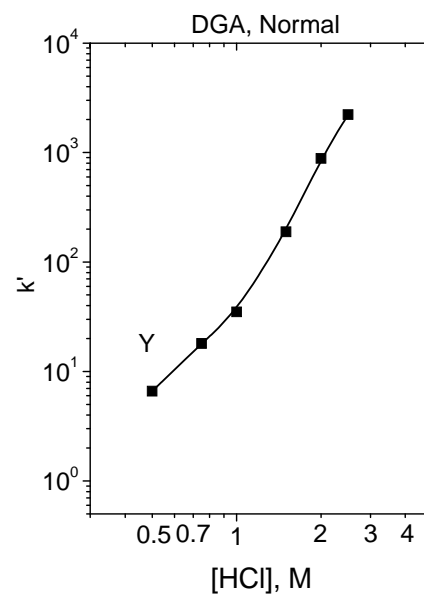
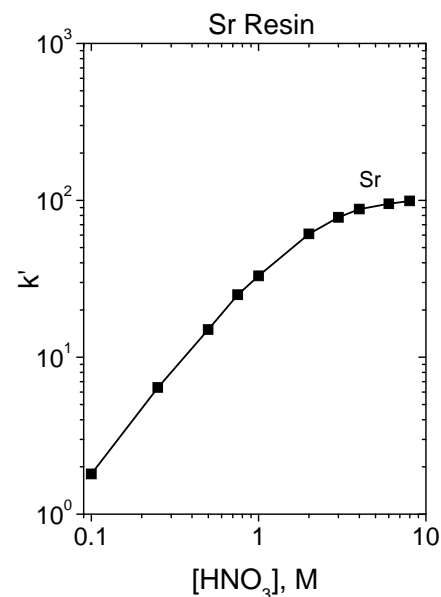
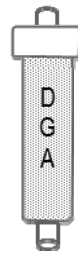
(5) Separate Sr and DGA cartridges.



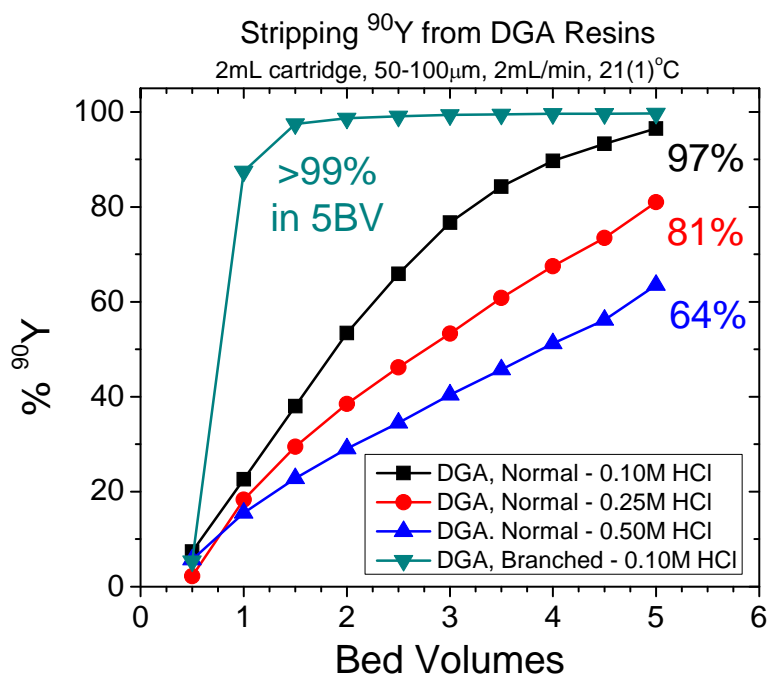
(6) Rinse DGA with 10mL 8M HCl.

(7) Strip <sup>90</sup>Y with 10mL 0.1M HCl. (For higher <sup>90</sup>Y recovery in smaller volume, strip in opposite direction or use DGA, Branched)

(8) Strip <sup>90</sup>Sr from Sr Resin cartridge with 15mL 0.5M HCl. (More complete recovery may be obtained by stripping in opposite direction of load.) Save <sup>90</sup>Sr for future use.



\*Adding 1mg of stable Sr to the <sup>90</sup>Sr source can help improve <sup>90</sup>Sr 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).