Separation of ^{86}Y From Sr Target

AN-1623-10

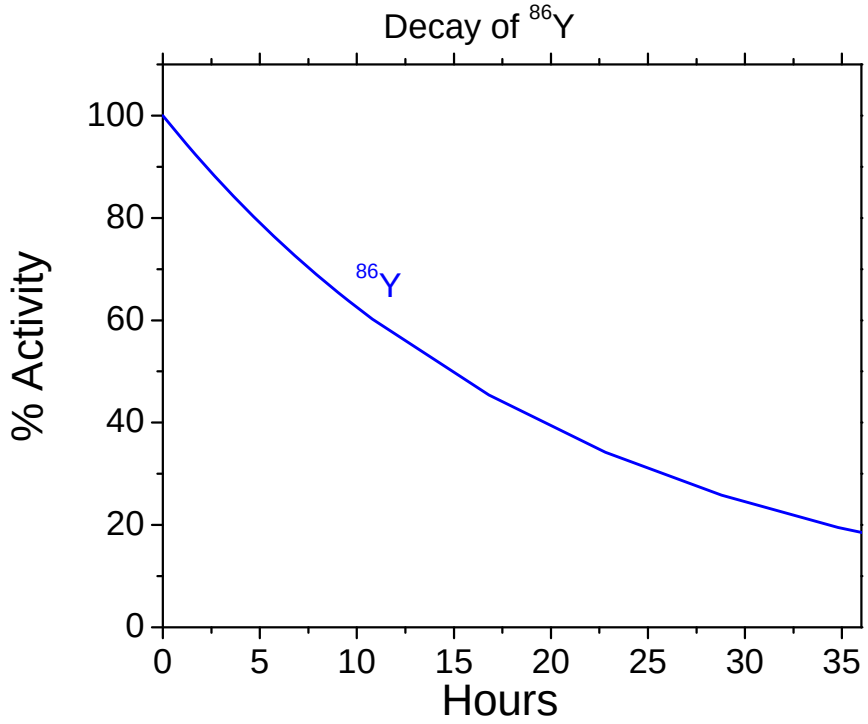
Summary of Method A method for the separation of ^{86}Y ($t_{1/2}$ = 14.74 hours) from strontium target material is presented. The method employs 2mL cartridges of DGA and LN resins to obtain high purity ^{86}Y in small volumes of eluate, while providing high separation factors from chemical and radiologic impurities. The primary separation of ^{86}Y from the dissolved yttrium target can be performed in 8M HNO_3 or HCl using DGA resin. ^{86}Y is retained while strontium passes through DGA. ^{86}Y is recovered from DGA with a small volume of 0.25M HCl and directly loaded onto a 2mL cartridge of LN resin. ^{86}Y is retained while additional decontamination from strontium is achieved. ^{86}Y is then stripped from LN resin onto a second 2mL cartridge of DGA resin using 8M HCl. ^{86}Y is then eluted from DGA using 10mL 0.1M HCl. DGA, Branched is used to allow stripping of ^{86}Y in a minimal volume of 0.1M HCl. Average yield of Y separation from 500mg of Sr was >95% with >10^{10} separation factor from Sr.

Reagents

DGA, Branched Cartridges (Eichrom DB-R50-S)
LN Resin Cartridges (Eichrom LN-R50-S)
Deionized Water
HCl
HNO_3

Equipment

Glass or plastic vials/bottles for collection of ^{89}Zr and waste.
30mL and 60mL plastic luer lock syringes.
Gamma Spectrometry System or alternative for measurement of ^{86}Y.
ICP-AES or alternative for measurement of Sr.



^{86}Y Separation Using DGA and LN Resin

(1) Dissolve strontium target. Adjust to 50-100mL of 8M HCl or HNO_3.

(2) Precondition 2mL DGA cartridge with 10mL 8M HCl or HNO_3.

(3) Load sample onto DGA at 4-5 mL/min.

(4) Rinse DGA with 25mL 8M HNO_3.

(5) Rinse DGA with 25mL 1M HNO_3.

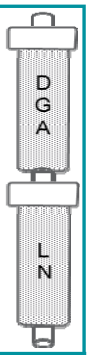
(6) Replace syringe or reservoir with clean syringe or reservoir.

(7) Precondition 2mL LN resin cartridge with 10mL 0.25M HCl.

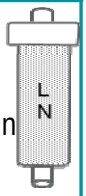
(8) Place LN resin cartridge below DGA cartridge.

(8) Strip ^{86}Y from DGA and load onto LN with 25mL 0.25M HCl.

(9) Separate DGA and LN cartridges.



(10) Rinse LN resin cartridge with 25mL 0.5M HCl.



(11) Precondition 2mL DGA resin cartridge with 10mL 8M HCl.

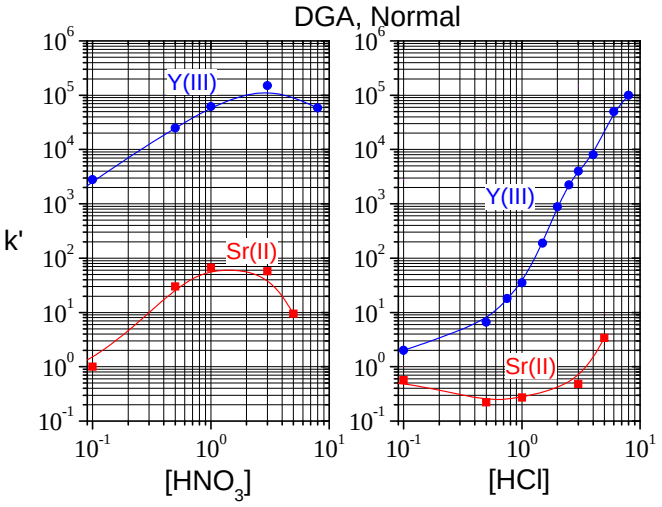
(12) Place DGA resin cartridge below LN cartridge.

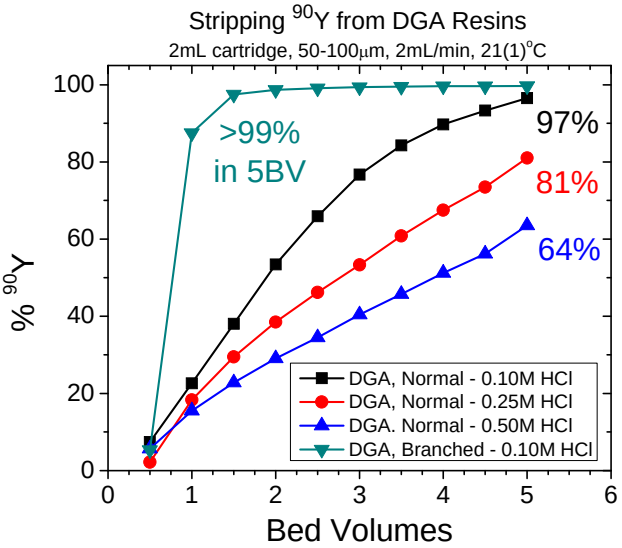
(13) Strip ^{86}Y from LN and load onto DGA with 25mL 8M HCl.

(14) Separate LN and DGA cartridges.

(15) Rinse DGA with 25mL 5M HCl.

(16) Strip ^{86}Y with 5-10mL 0.1M HCl.





References

1) E. P. Horwitz and D. R. McAlister, Unpublished data (2015 and 2016).