# $^{210}$Po Generator

AN-1616b-11

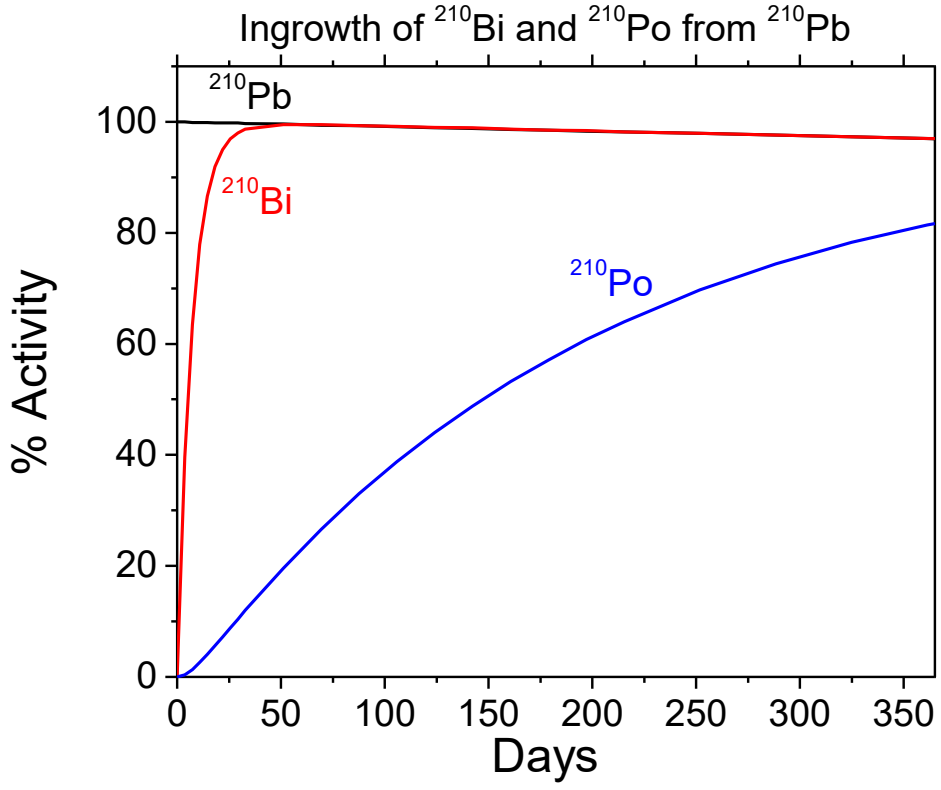
**Summary of Method** A method for the preparation of $^{210}$Po ($t_{1/2}$ = 138.4 days) from $^{210}$Pb ($t_{1/2}$ = 22.26 years) source material is presented. The method employs 2mL cartridges of DGA and Sr resins to obtain high purity $^{210}$Po in small volumes of eluate while preserving valuable $^{210}$Pb source material. The source material, containing $^{210}$Pb/$^{210}$Bi/$^{210}$Bi in 2.67M HCl, is loaded onto stacked 2mL cartridges of DGA and Sr resins. $^{210}$Po and $^{210}$Bi are retained on DGA Resin, while $^{210}$Pb is retained on Sr Resin. The $^{210}$Pb source is recovered from Sr Resin with a small volume of 8M HCl. Following a suitable ingrowth period, the $^{210}$Pb can be diluted to 2.67M HCl and used to produce additional $^{210}$Po. The $^{210}$Pb is preserved nearly indefinitely and continuously purified from chemical and radiologic impurities run to run. $^{210}$Po is recovered from DGA resin with 0.05M $HN0_3$, but should be acidified to 1M $HNO_3$ to prevent loss of Po to glass vials. The $^{210}$Bi will remain on the DGA resin during the Po elution, and can be recoverd with 10mL of 0.05M ammonium bioxalate. The DGA/Sr Resin chemistry is an improvement over the UTEVA/Sr Resin chemistry previously described (AN-1616a), which required 6M $HNO_3$ to recover the $^{210}$Po.

## Reagents

Sr Resin Cartridges (Eichrom SR-R50-S)
DGA, Normal Cartridges (Eichrom DN-R50-S)
Liquid Scintillation Cocktail
$^{210}$Pb Source
Deionized Water
HCl
$HNO_3$

## Equipment

Glass vials for storage of $^{210}$Pb source.
Glass or plastic vials/bottles for collection of $^{210}$Po, $^{210}$Bi and waste.
10, 20 or 30mL plastic luer lock syringes
Liquid Scintillation System for measurement of $^{210}$Bi and $^{210}$Po .
Gamma Spectrometry System for measurement of $^{210}$Pb.



## $^{210}Pb/^{210}Bi/^{210}Po$ Separation

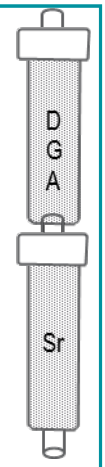
(1) Precondition stacked 2mL cartridges of DGA and Sr Resins with 10mL 2M HCl.

(2) Dilute $^{210}Pb$ eluate from previous separation with 20mL DI $H_2O$. (If new $^{210}Pb$ source, dilute to 20mL with 2M HCl.)*

(3) Load $^{210}Pb/^{210}Bi/^{210}Po$ in 30mL 2.67M HCl. (20mL 2M HCl).

(4) Rinse DGA/Sr with 10mL 2M HCl.

(5) Elute 10mL 8M HCl through DGA/Sr, collecting $^{210}Pb$ Source material. Save $^{210}Pb$ for future use.

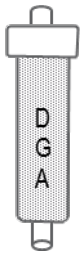



(6) Separate DGA/Sr.

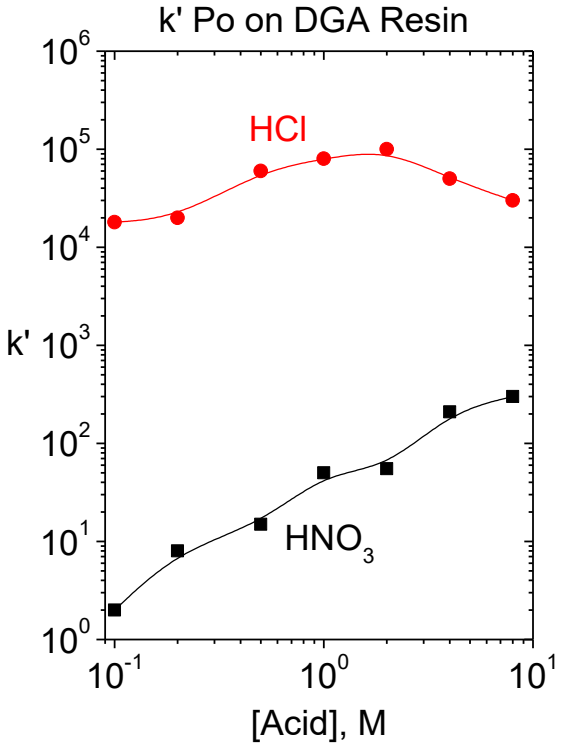
(7) Rinse DGA with 10mL 8M $HNO_3$. Discard as waste.

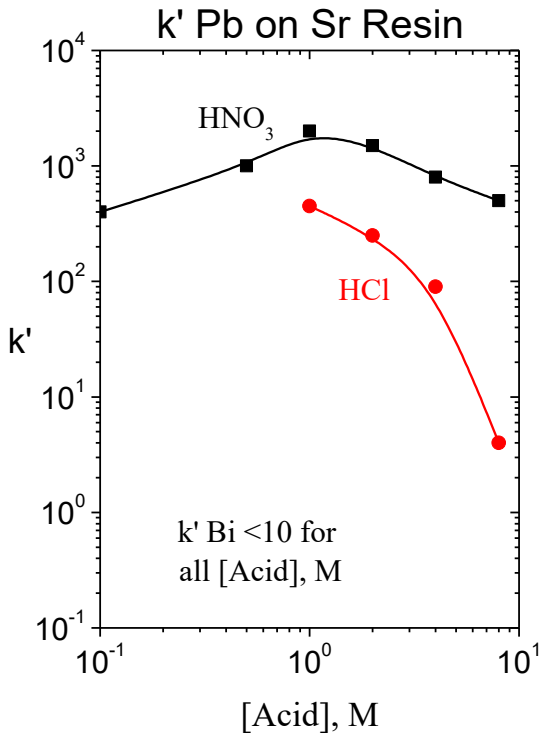
(8) Strip $^{210}Po$ from DGA with 15mL 0.05M $HNO_3$.*

*Acidification of the $^{210}Pb$ to 1M $HNO_3$ is recommended to prevent hydrolysis and loss of the $^{210}Po$ to the storage vial.




*Adding 1mg of stable Pb to the $^{210}Pb$ source can help improve $^{210}Pb$ 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).