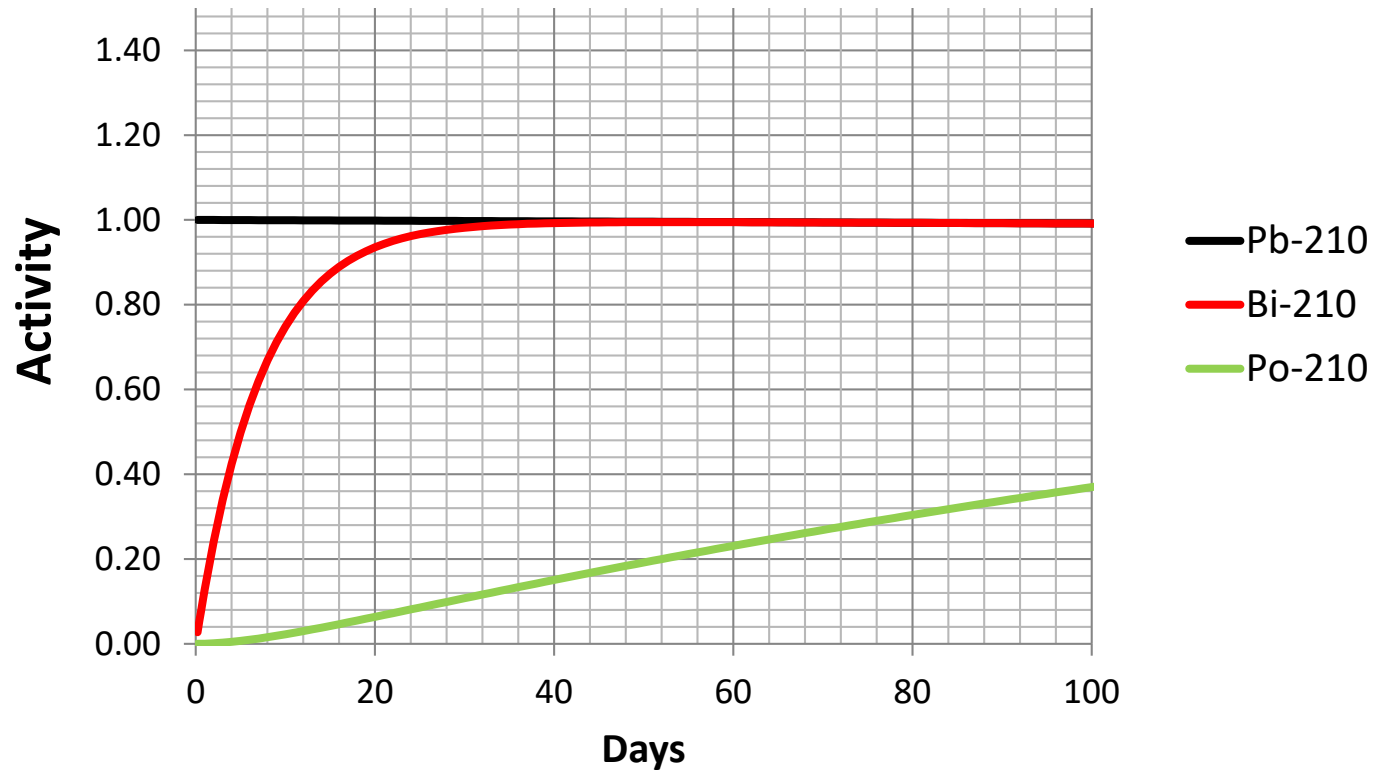


A comparison of methodologies in analyzing ^{210}Pb - ^{210}Bi - ^{210}Po

Per Roos, Nikola Markovic, Sven Nielsen

How to do? What way to go?

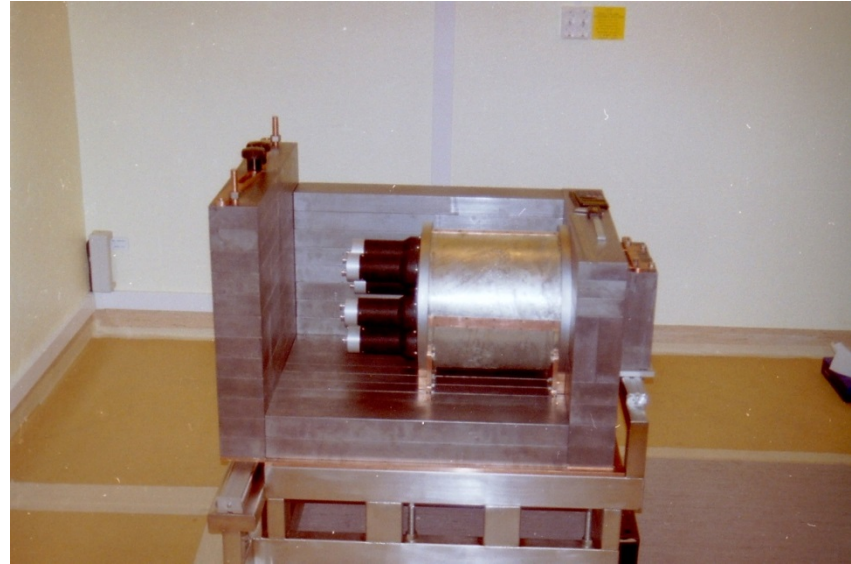
Ingrowth of ^{210}Bi and ^{210}Po from ^{210}Pb



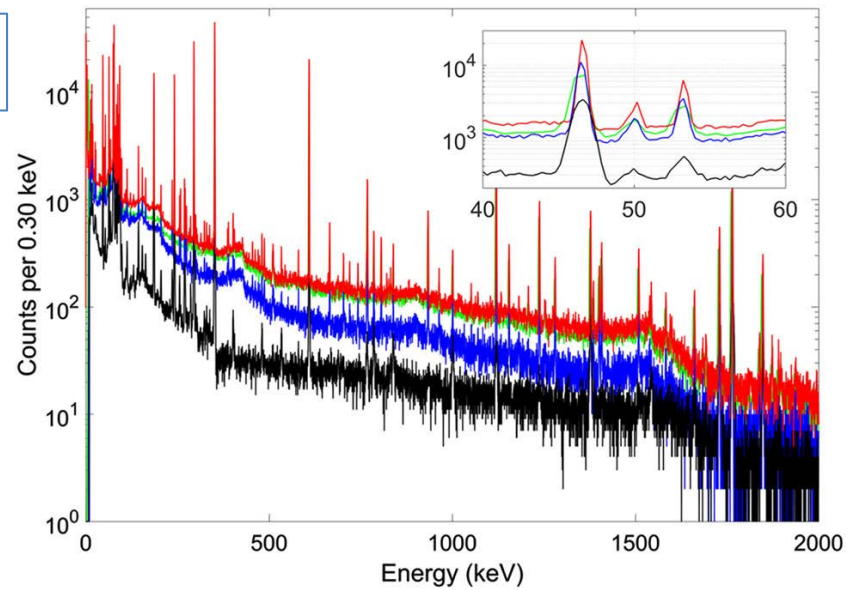
Gamma spectrometry of ^{210}Pb 46 keV (4%)

- "Large" ($\sim 15\text{g}$) samples on single Ge-detector.
- Small (0-4g) samples in anti-compton shielded well-Ge

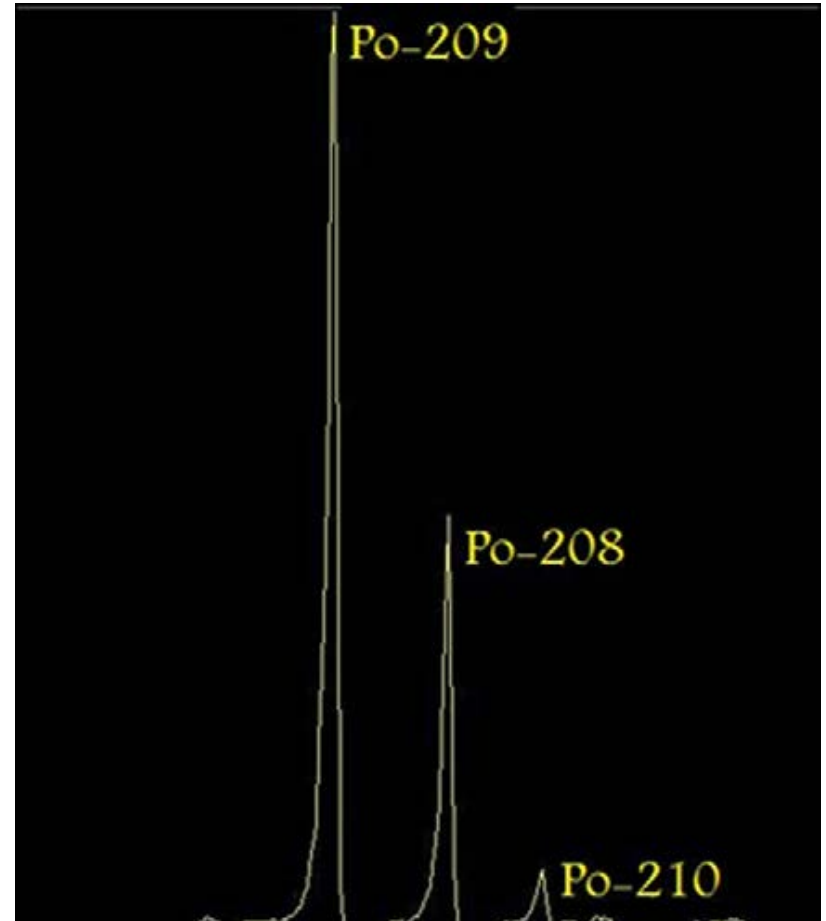
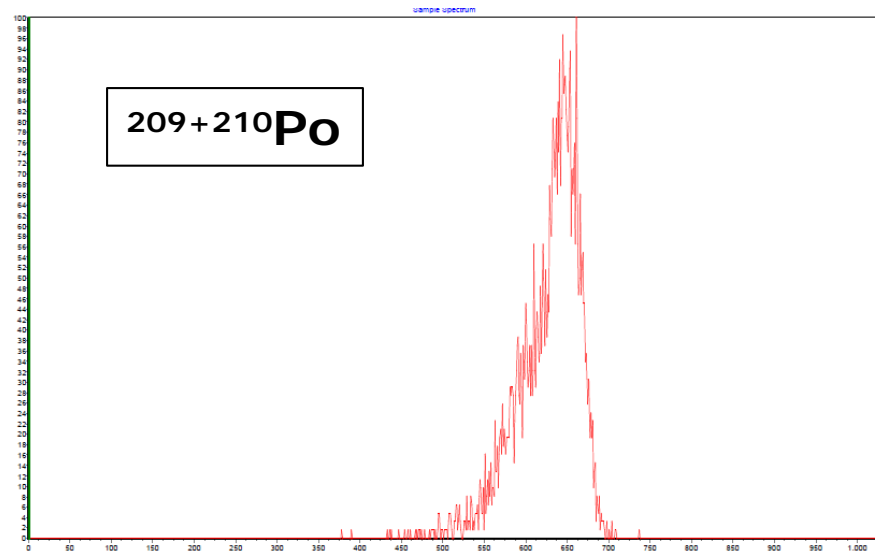
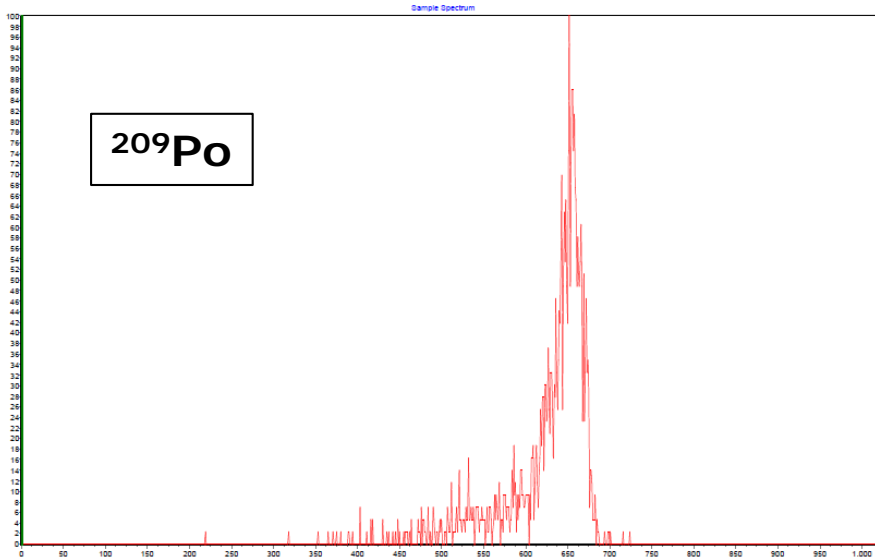


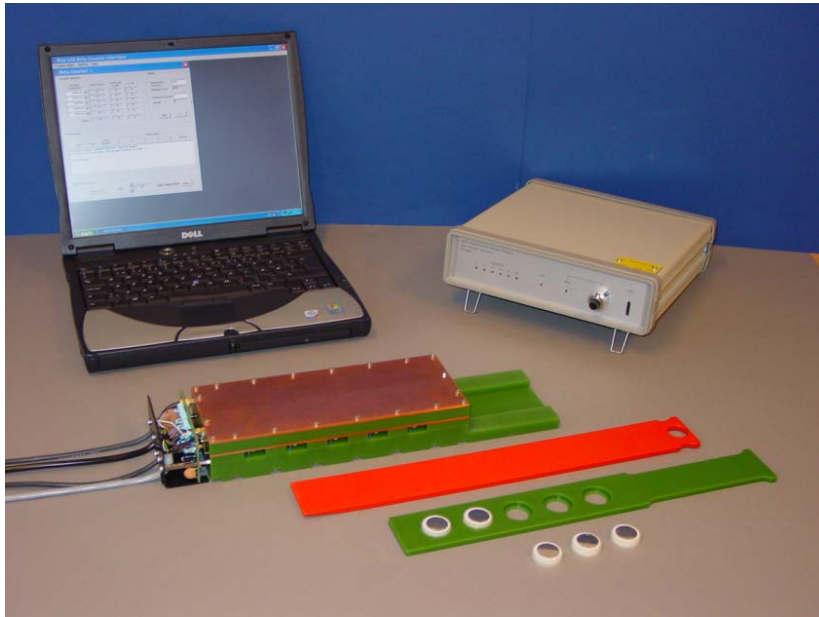


Low-level gamma spectrometry for the determination of ^{210}Pb
Markovic et.al. JRNC, 311 (2017), 1473-1478



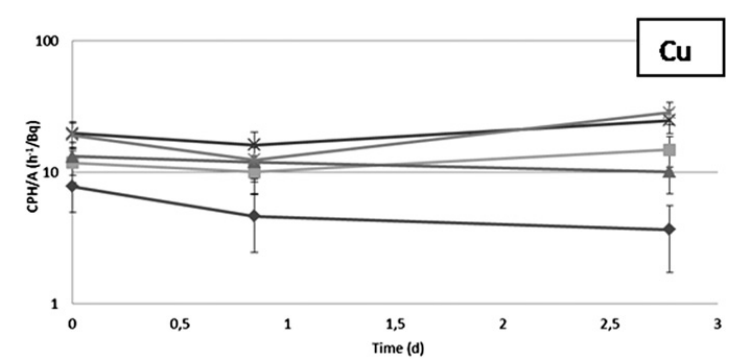
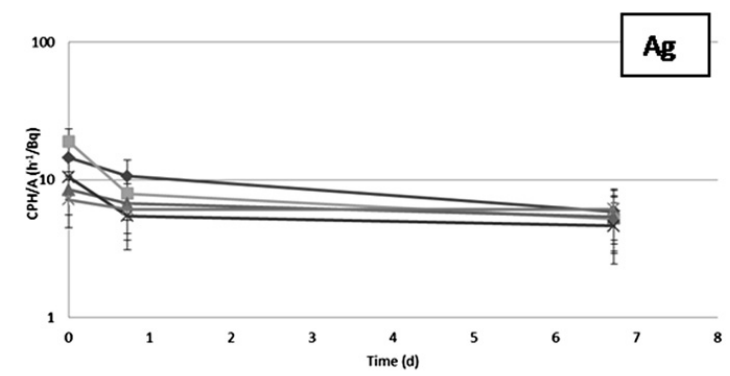
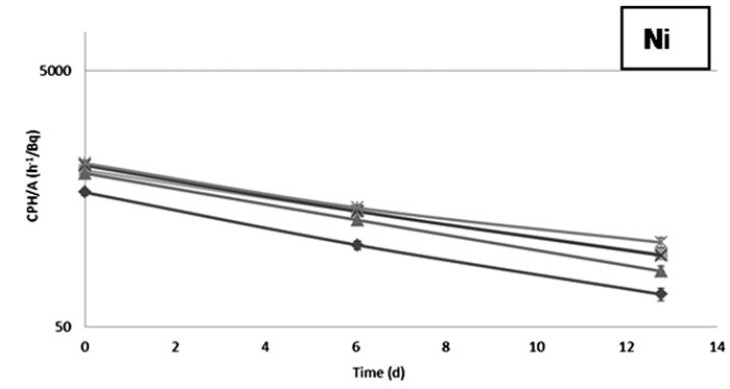
210Po by LSC?





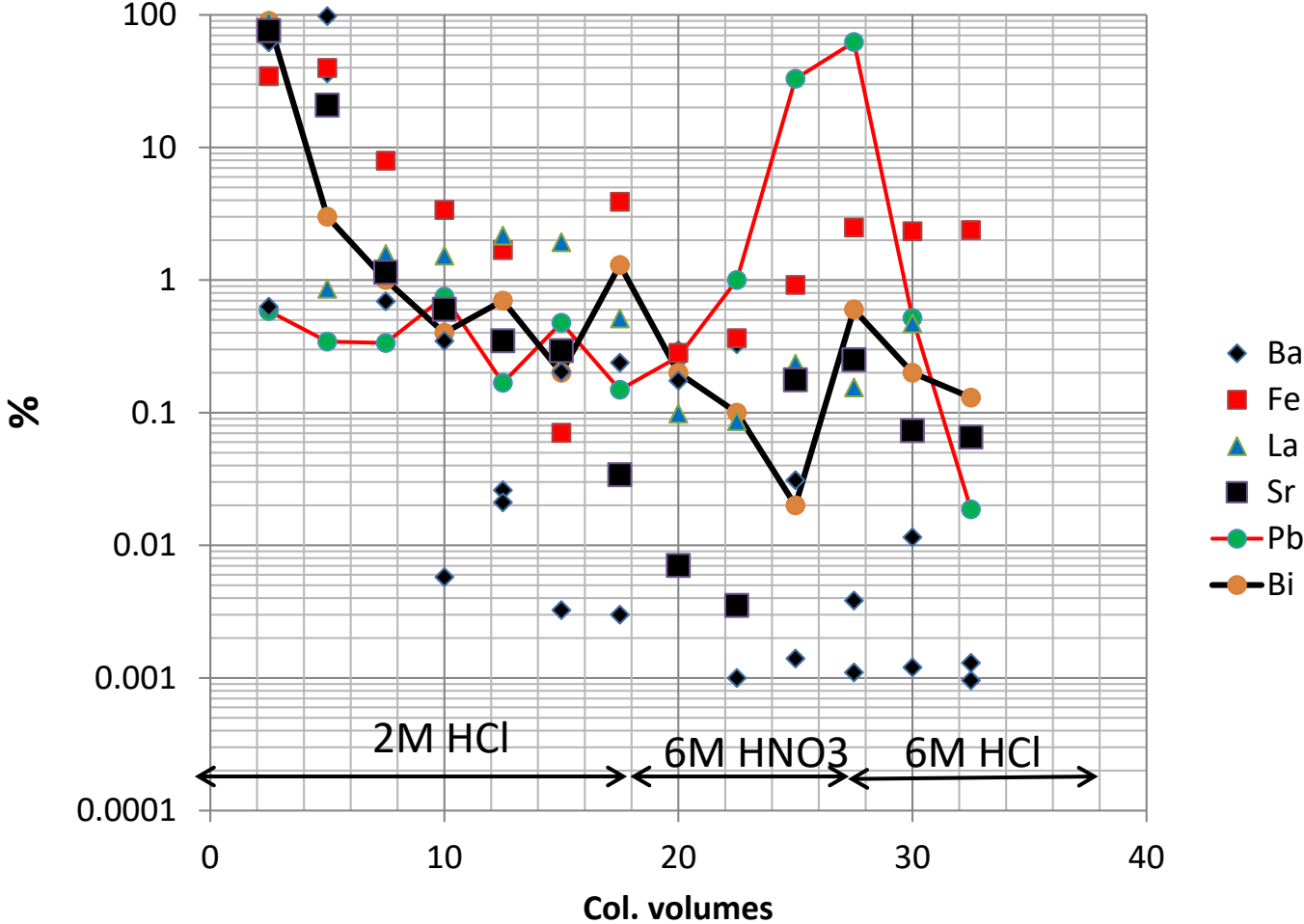
Aspects on the analysis of ^{210}Po
Henricsson et.al. JER 102, (2011), 415-419.

Co-adsorption of ^{210}Pb and ^{210}Bi
 Discs for solid-state alpha spec?

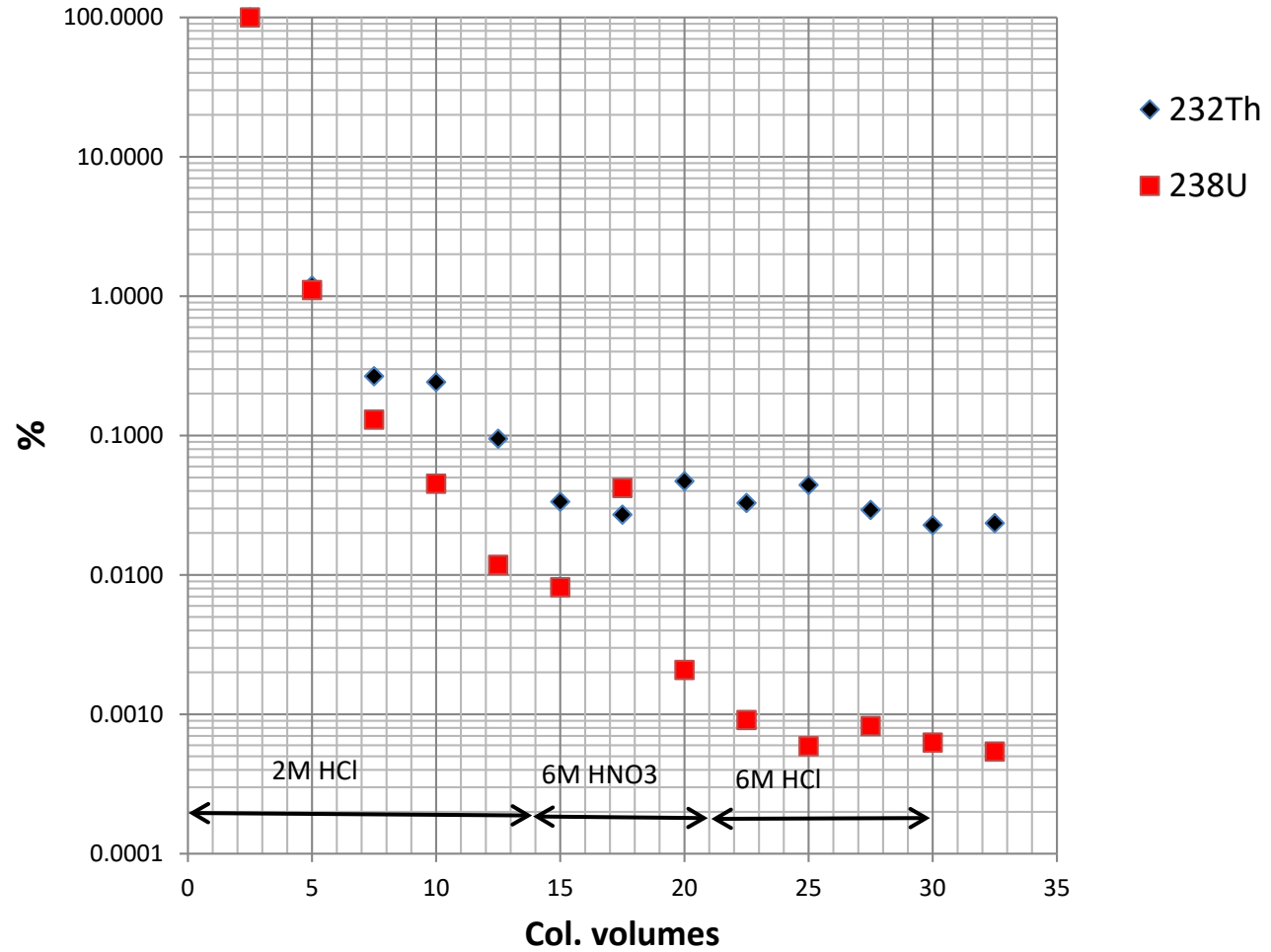


Sr-Resin chosen for isolation of ^{210}Pb

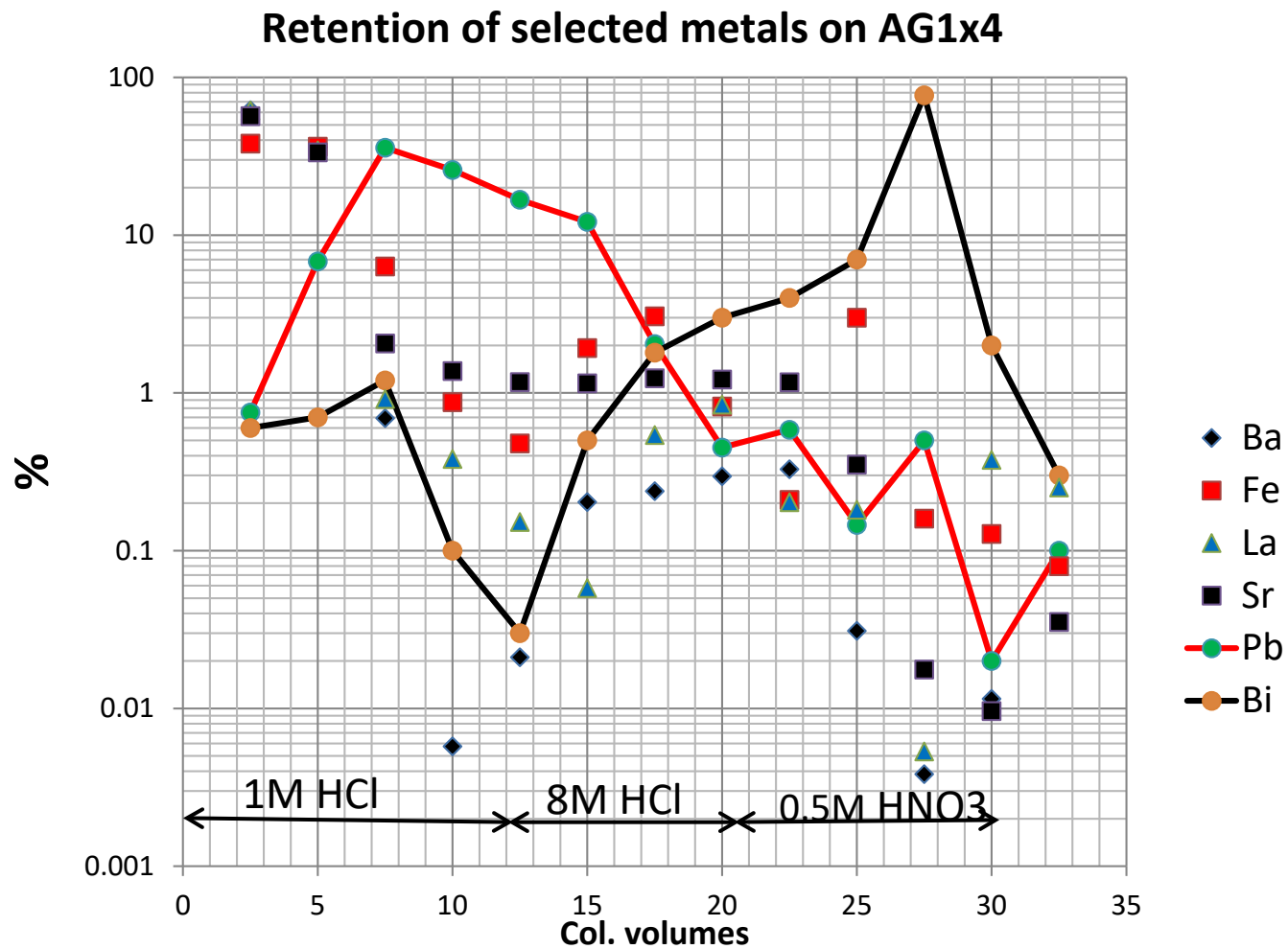
Retention of selected metals on Sr-Resin



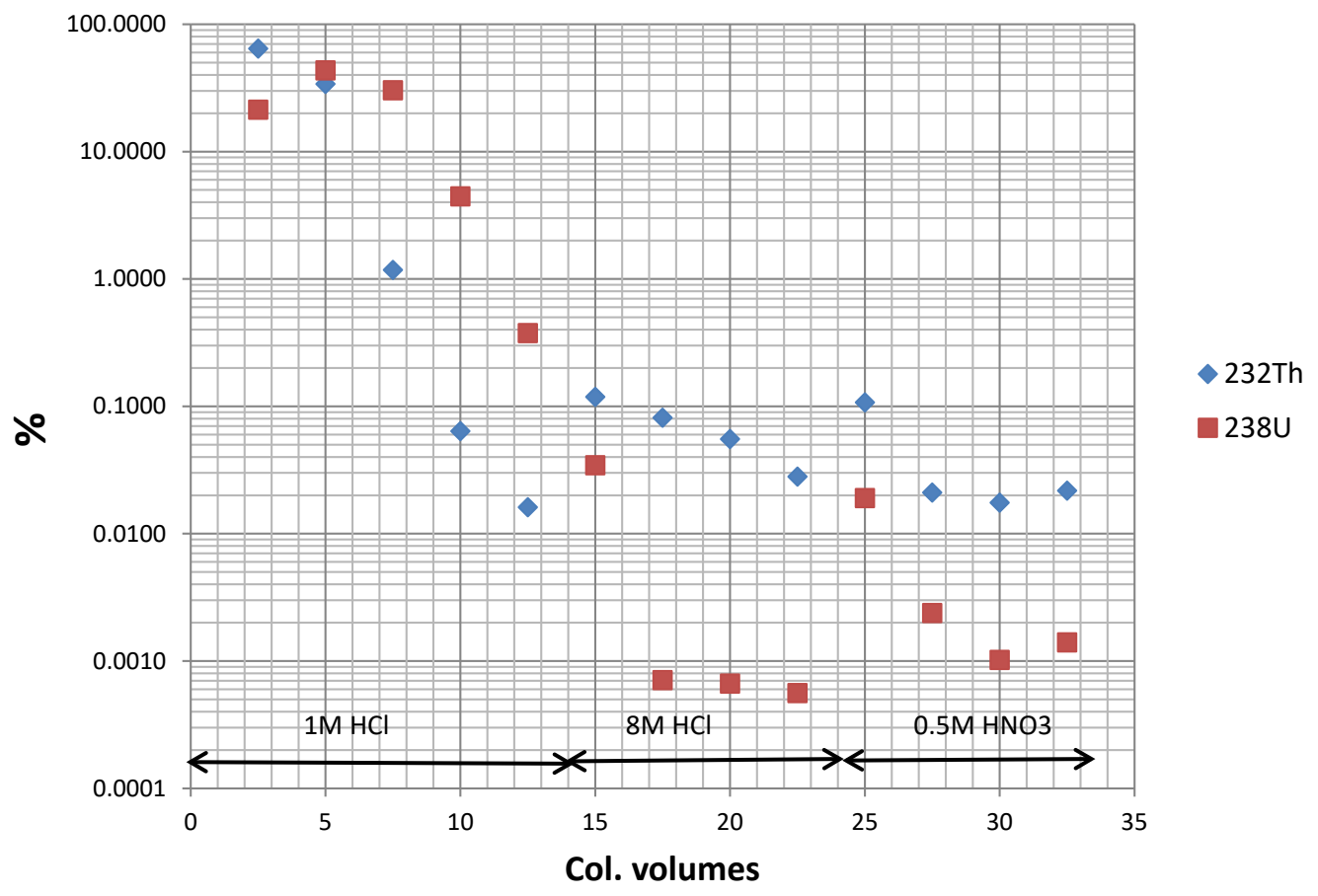
U & Th on Sr-Resin



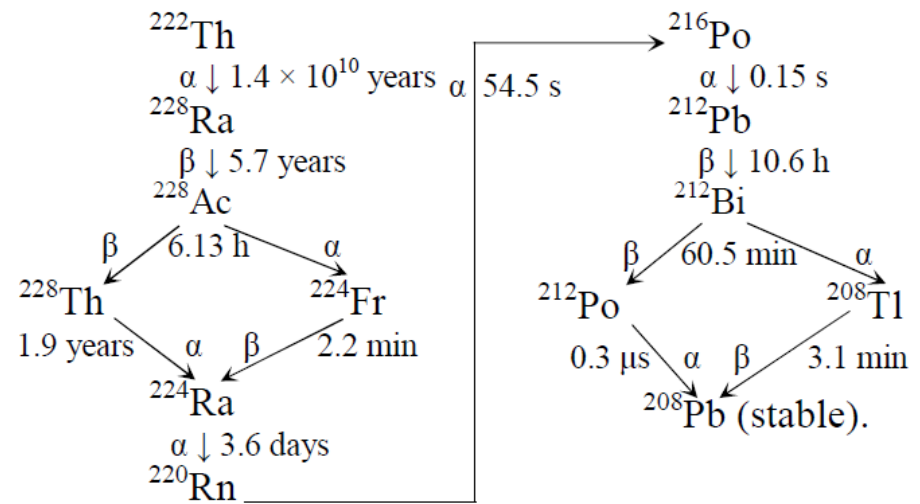
Anion exchange using AG1x4 used for ^{210}Bi



U & Th on AG1x4



Choice of tracers



Stable lead

- + No stress.
- - Potential conflict with Pb-scientists (severe memory effects in ICP-MS)
- - Risk of ^{210}Pb in stable lead standard (typical $< 1\text{Bq/g}$ of lead so minor problem)

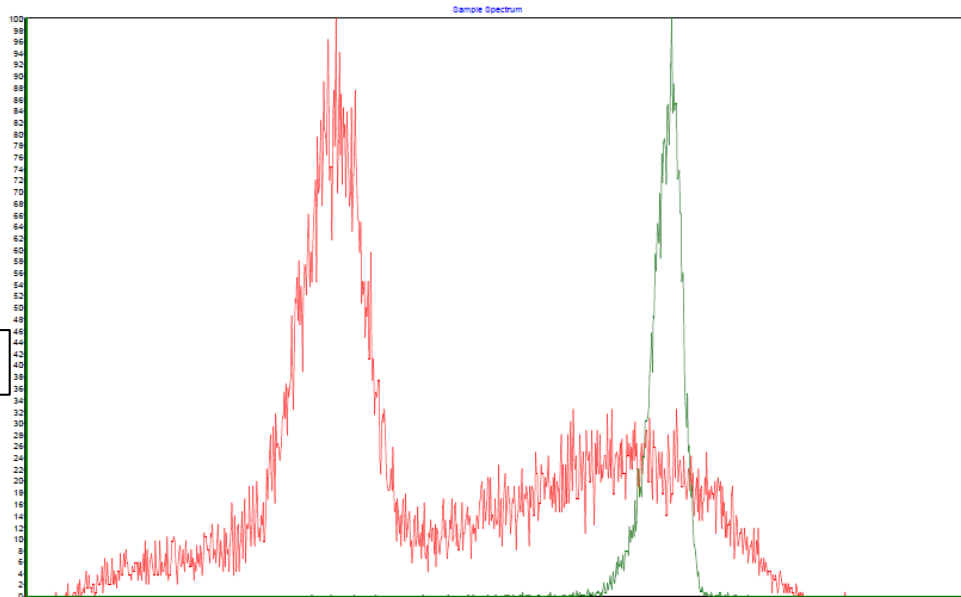
^{212}Pb (10.6h half-life).

Extracted from aged ^{232}Th , 'hot' ^{228}Ra -samples (eg- scale from oil-platforms) or aged ^{232}U .

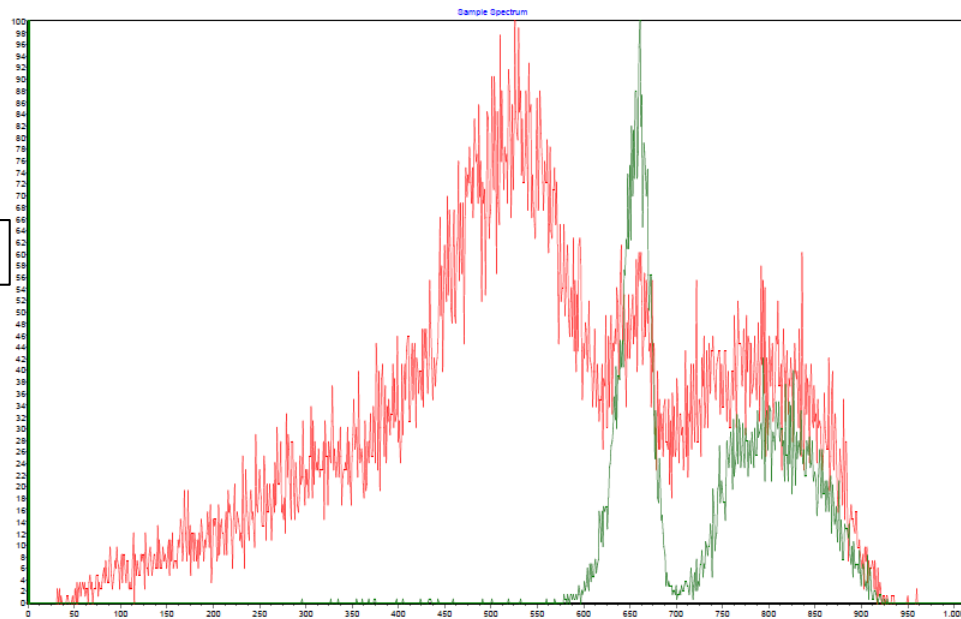
- ^{232}Th -salts have the disadvantage of sometimes containing ^{230}Th (and trace ^{210}Pb).
- ^{228}Th isolation and ^{224}Ra ingrowth required for ^{228}Ra -samples to remove ^{226}Ra - ^{210}Pb .
- Following isolation of ^{228}Th by anion exchange the eluted ^{224}Ra (8M HNO_3) is converted to 0.2M HCl and adsorbed onto Dowex 50Wx8.
- Elution of ^{212}Pb using 1M HCl .

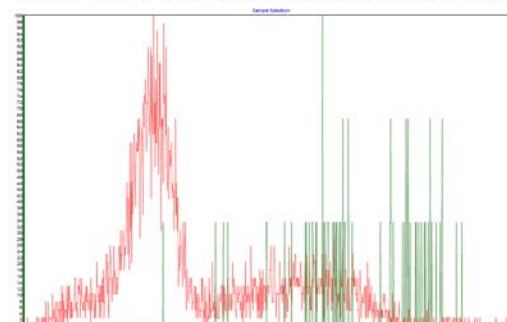
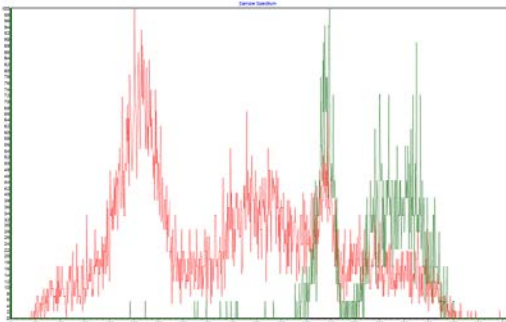
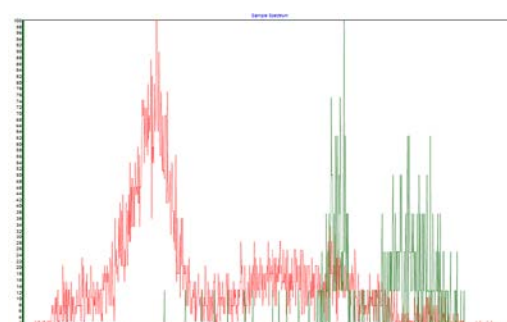
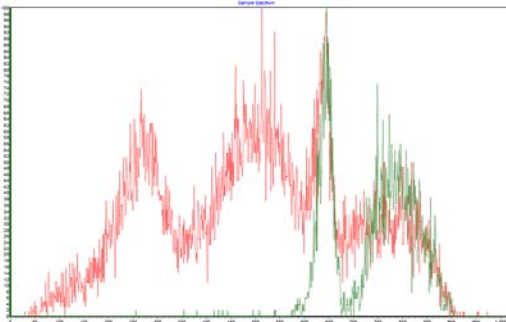
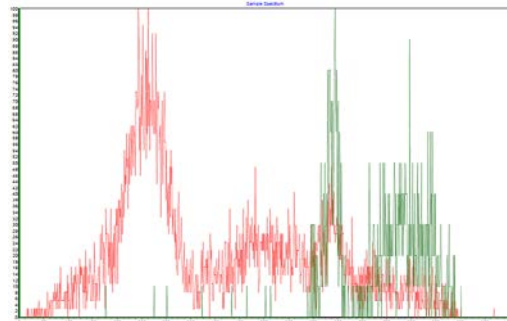
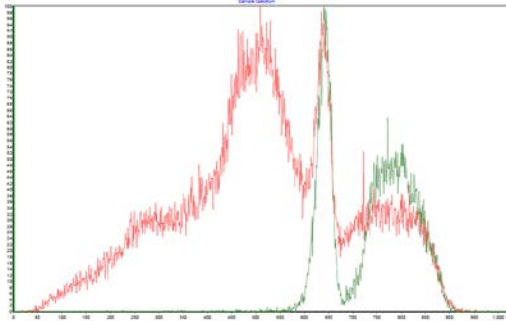
^{210}Pb with ^{212}Pb as tracer.

^{210}Pb - ^{210}Bi - ^{210}Po

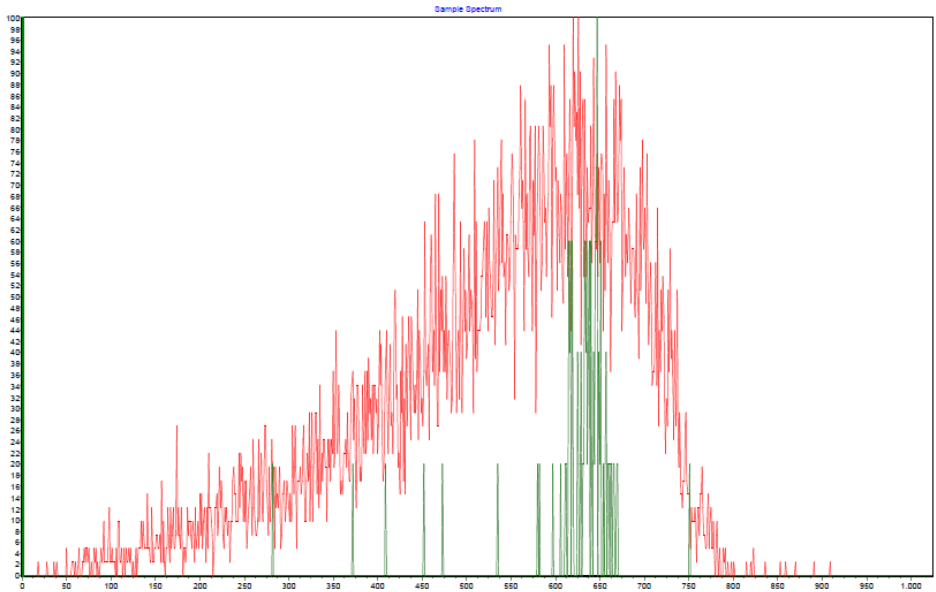
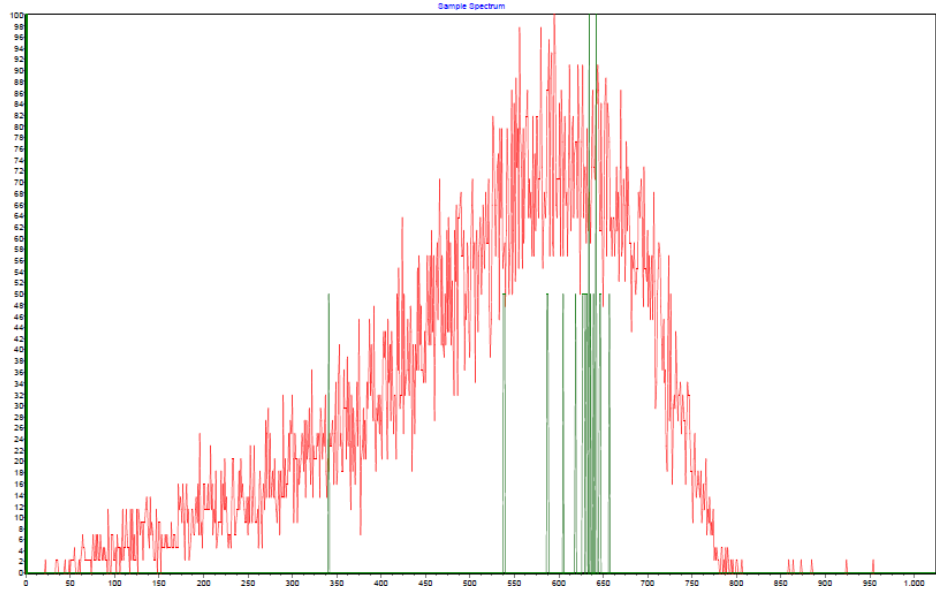


^{212}Pb - ^{212}Bi - ^{212}Po - ^{208}Tl





^{210}Bi by stable Bi
as tracer.



Conclusion

^{210}Pb analysed using gamma spectrometry or LSC using stable Pb or ^{212}Pb as tracer.

^{210}Bi analysed using LSC with stable Bi as tracer.

^{210}Po analysed by solid state alpha spectrometry.