

Po-210 isotope generator based on SR Resin

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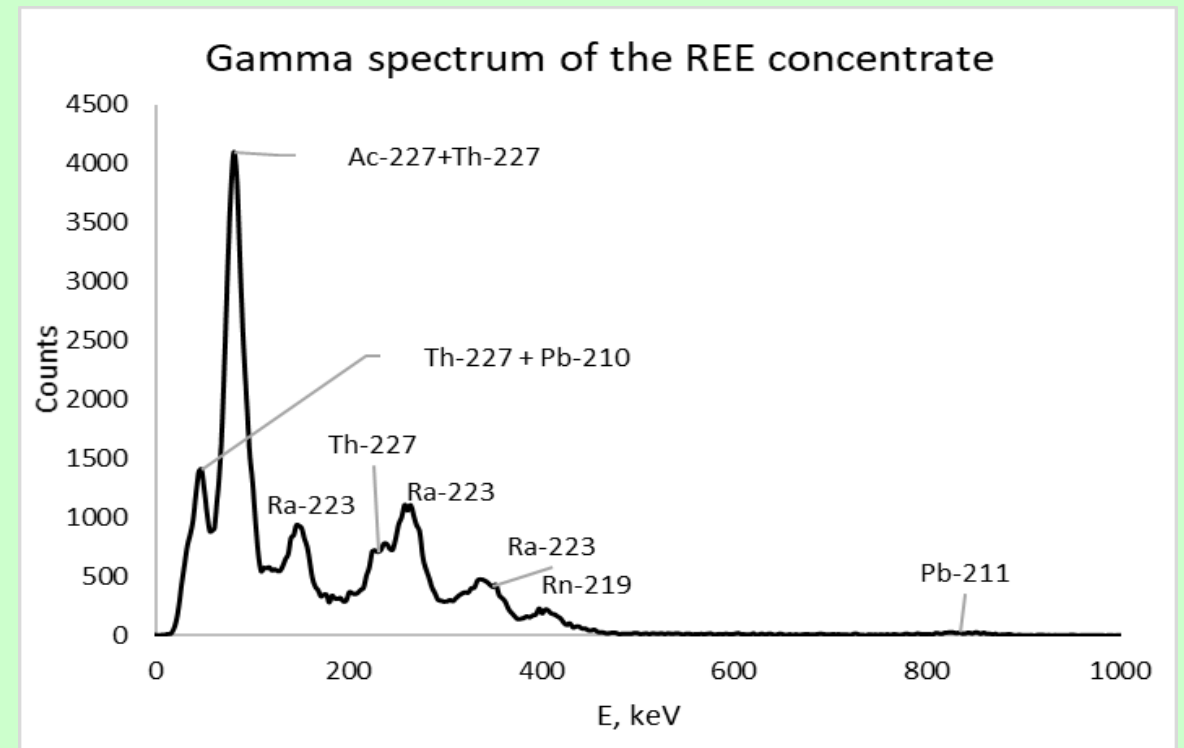
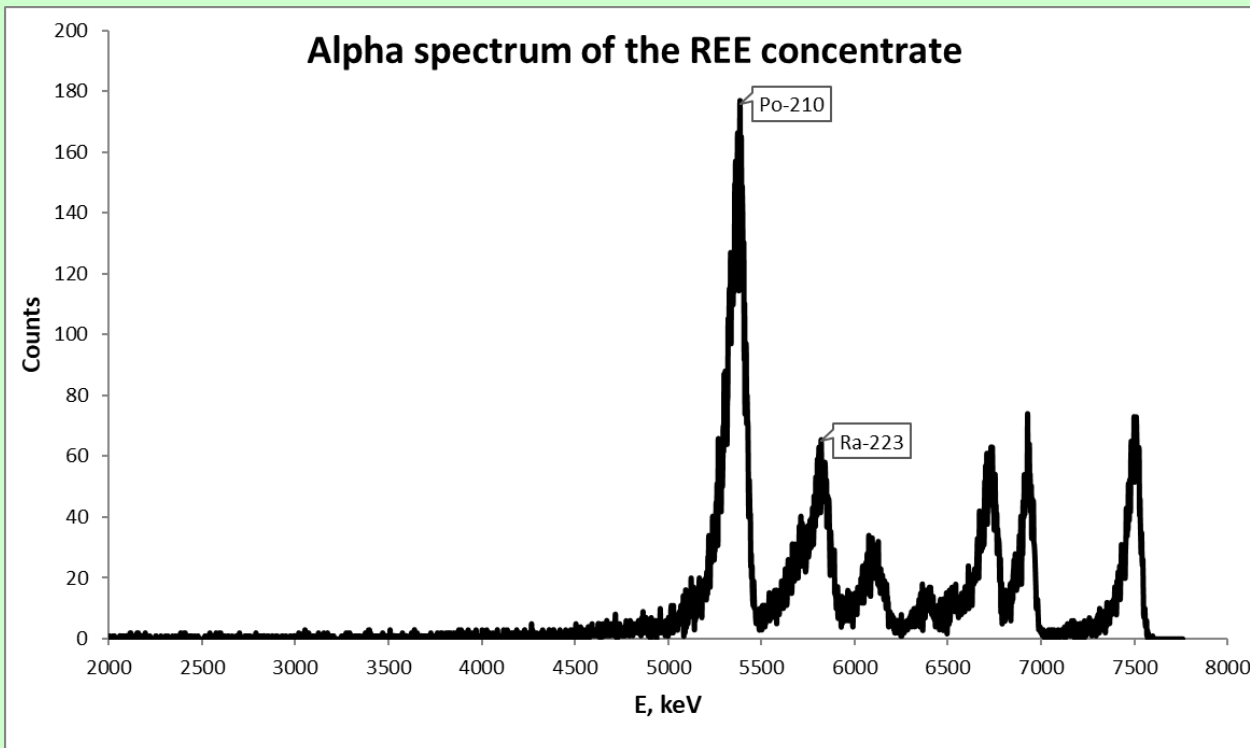
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Virtual UGM 2021

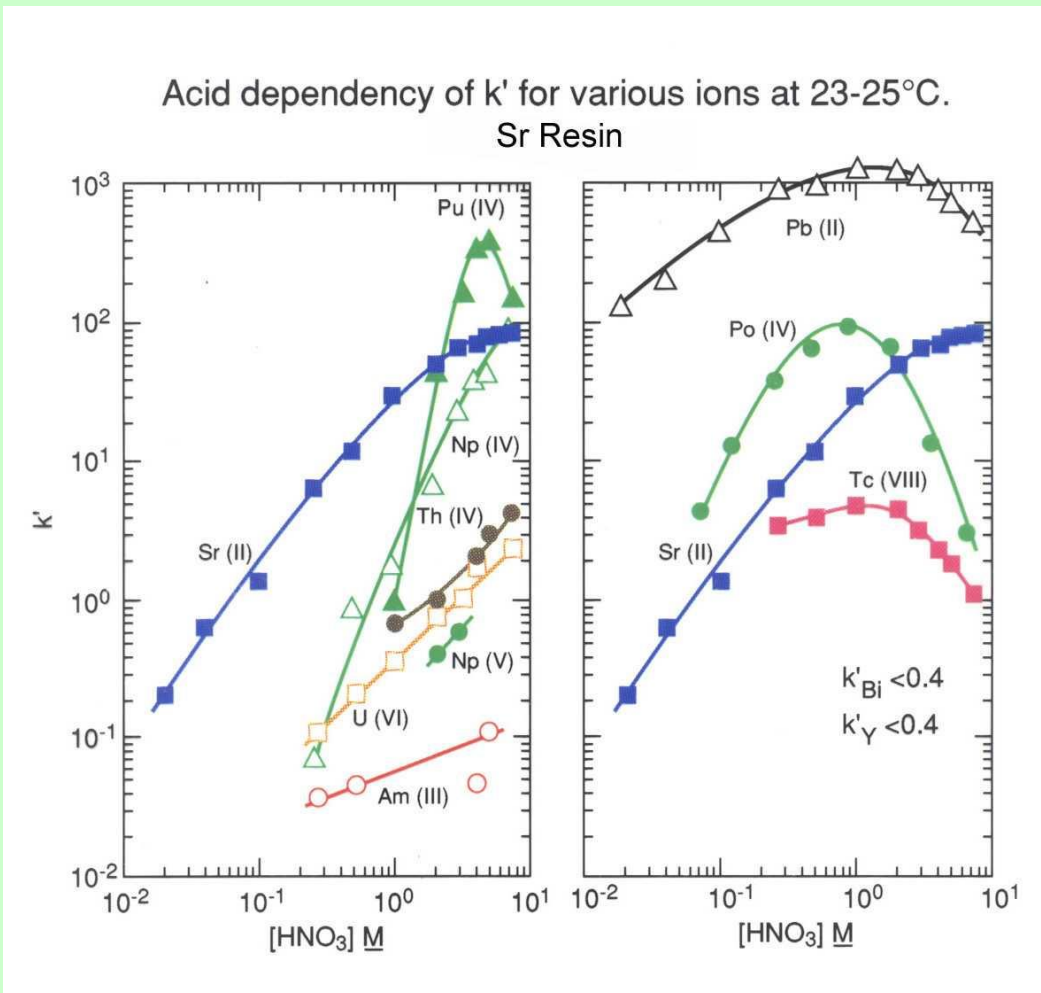
A rare earth elements (REE) concentrate with an elevated content of natural radionuclides was obtained at one of uranium plants in Russia.

The main components: Na + K ($\approx 50\%$), REE (3.5%), Ca (22%), Mg (8%), Mn (2%), Zn (1.5%), Sr (0.5%), ...

Radionuclide	Pb-210	Ac-227	U-238	Th-232
Activity, kBq/kg	2 100	500	2.5	1.7



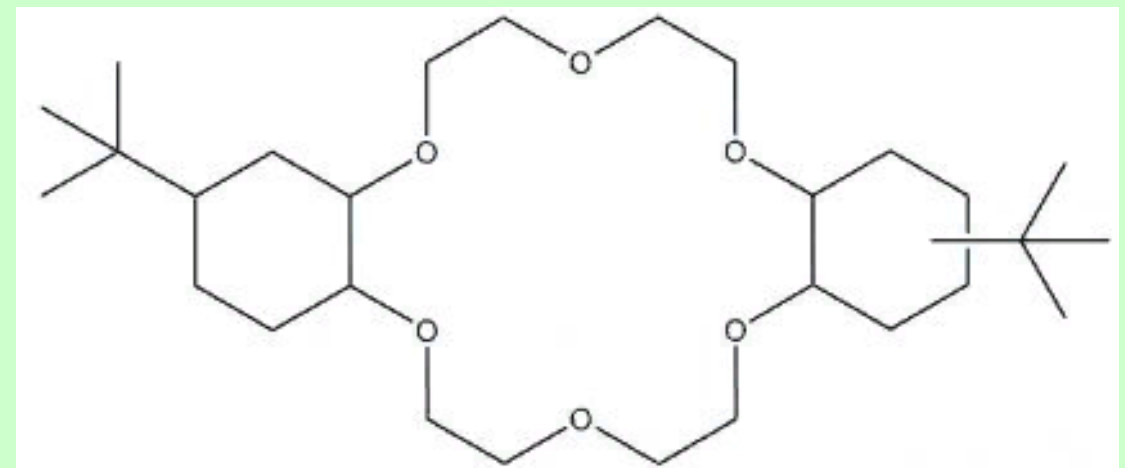
k' values of different elements on SR resin



Horwitz P., Chiarizia R., Dietz M., *Solvent Extraction and Ion Exchange*, **10** (2), pp. 310 (1992); Eichrom Referenz HP292.

SR Resin is an extraction chromatographic resin based on 4,4'(5')-di-*t*-butylcyclohexano-18-crown-6

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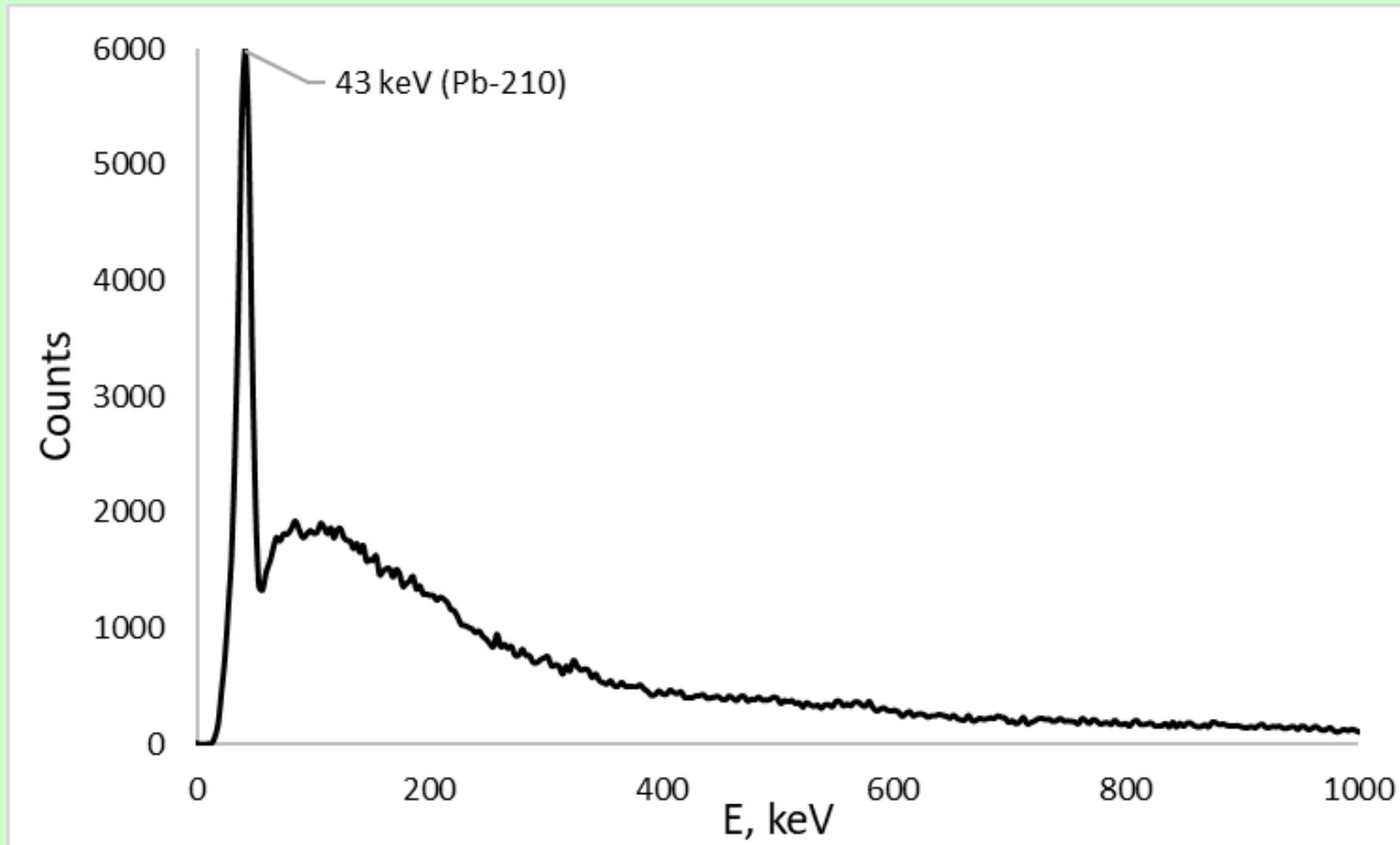


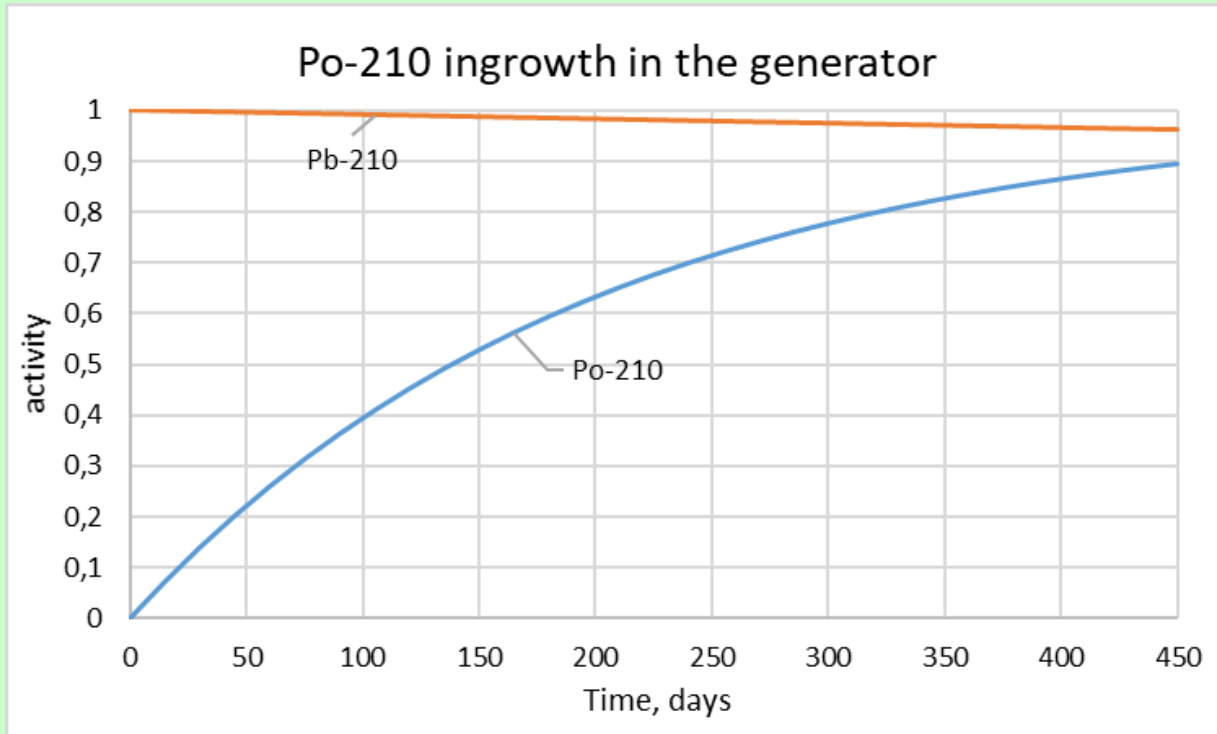


An isotope generator of Po-210 was prepared via selective sorption of Pb-210 onto the SR Resin column from 0.5 g of the REE concentrate dissolved in 30 mL of 3M HNO₃.

- Loading conditions: **3M HNO₃**.
- Rinsing: **10 mL of 3M HNO₃**.
- Po-210 elution: **10 mL of 0.05M HNO₃**.
- \approx 1000 Bq of Pb-210 in the generator.

SR Resin has provided a very clean separation of Pb-210 from other impurities – no other gamma emitters are observed at the gamma spectrum of the generator column.





Because of a long half-life of Po-210, its ingrowth in column is very slow.

The generator was loaded in **March 2020**.

Till now, **4 elutions** of Po-210 were performed:

- **September, 2020**
- **December, 2020**
- **March, 2021**
- **September, 2021**

The experience of exploitation of the Po-210 generator:

- Bi-210 is eluted together with Po-210 (this was not a problem in our experiments due to a short half-life of Bi-210 and another decay mode).
- The age of the SR Resin column was nearly 10 years at the moment of Pb-210 loading – this was not a problem.
- The SR Resin column completely dried twice between elutions – this did not affect its work.
- Pb-210 loss after 4 elutions did not exceed 1%.

Thank you for attention!

Questions?

The reported study was funded by RFBR, project number 20-03-00931.