

## Development of automated separation system for determination of strontium-90 in soil and fish bone samples

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There is an increasing demand for monitoring strontium-90 (<sup>90</sup>Sr) in terrestrial and aqueous environments near nuclear facilities, especially after the accident of the Fukushima Daiichi Nuclear Power Plant in 2011. However, analysis of <sup>90</sup>Sr requires the complicated and time-consuming chemical separation. Chelating resin, DGA Resin, showed the superior selectivity and useful for direct separation of <sup>90</sup>Y in secular equilibrium to <sup>90</sup>Sr, which is powerful tool to determine the <sup>90</sup>Sr concentration in environmental sample. Tazoe *et al.* (2016) [1] proposed high throughput analytical procedure by using DGA Resin chromatography coupled with Fe hydroxide coprecipitation to determine <sup>90</sup>Sr concentration in seawater. The advantages of this procedure are robust to matrix elements, such as Al, Fe, Ca, and Mg and the performance of separation (decontamination factor of interference elements and chemical yield for Y) capable of being maintained by even rough partition of eluate. Separation system can be replaced to automated separation system.

Eluents for chromatography using DGA Resin are 8 M HNO<sub>3</sub>, 8 M HCl, a mixture of 3 M HNO<sub>3</sub>/0.3 M HF, 0.2 M HNO<sub>3</sub> and 0.1 M HCl. Ceramic and PEEK materials should be avoided the used for liquid contact member for HF and highly concentrated HNO<sub>3</sub>. Separation system consists of PFA tube and 12-ports PTFE rotary selector valve and 3-way PTFE valves, peristaltic pump, and fraction collector (CHF1225SC, Advantec Toyo). These devices are controlled by I/O remote timer (RT731, GL Science).

Certified reference material of soil (NIST SRM-4354) and fish bone (JSAC 0785) samples were examined to validate for developed system. This automated separation system can be also apply to analysis of REEs, Th, and U for geological samples.

[1] Tazoe *et al.* (2016) *Talanta* **152**, 219-227