

# Combination of automated chromatographic separation and off-line Cherenkov counting in determination of low level activity of Sr-90.

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## Content

Radiostrontium as an high yield fission product with long physical (28.75 years) and biological half-life ( $\sim 12$  years), is one of the most hazardous radiocontaminants in the environment. Therefore, almost all environmental radioactivity monitoring programs include its quantitative determination. Due to its radiochemical properties standard procedure for its determination is complicated and time consuming. In recent years fully automated approach for monitoring pure beta emitters has been developed. However, there is a lack of prompt and reliable methods for determination of low-level activities in environmental samples. In our laboratory semi-automated procedure for determination of  $^{89,90}\text{Sr}$  in liquid waste was established. Procedure includes separation of strontium from matrix on Super Lig 620 column followed by off line on column detection via Cherenkov counting on commercially available instrument. The goal is further development of mentioned method for monitoring environmental occurrence of  $^{90}\text{Sr}$  and determination of low level activity of  $^{90}\text{Sr}$  by Cherenkov detection. Therefore, in this paper procedure for determination of low level activity of Sr-90 which includes separation of strontium from matrix on chromatographic column followed by off line on column detection via Cherenkov counting will be presented. This includes simultaneous selective binding of  $^{90}\text{Sr}$  and  $^{90}\text{Y}$  on chromatographic column filed with mixture of DGA-SuperLig 620 resins and subsequent on column Cherenkov detection. With assumption that  $^{90}\text{Sr}$  is in equilibrium with its daughter  $^{90}\text{Y}$  in sample, mixture of SuperLig 620 and DGA resin might enable rapid selective separation of  $^{90}\text{Sr}$  and  $^{90}\text{Y}$  from matrices and direct on column Cherenkov counting. Therefore, method consist of automated sample delivery to the column filled with DGA/SuperLig resins and  $^{90}\text{Sr}$ - $^{90}\text{Y}$  Cherenkov counting on low level counter, TriCarb 3180 TR/SL. Sample is delivered to the column at constant flow rate until the breakthrough point and  $^{90}\text{Sr}$  via  $^{90}\text{Y}$  was determined by counting column in PE vial surrounded with  $\text{HNO}_3$  to achieve best efficiency determination. Thereby, to develop this method, best mixing options using different media were examined as well as breakthrough curves for strontium and yttrium in 0.5M  $\text{HNO}_3$  were determined. As quantitative determination requires accurate and precise determination of the detection efficiency it will be shown how Cherenkov counting efficiency depends on type of media, volume, color, presence of gamma emitters etc., and how detection limit can be improved by optimization of these parameters.

## About the Presenter

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