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Analysis of ⁵⁵Fe by combination of chromatographic separation and liquid scintillation detection

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55Fe is an activation product, low energetic beta emitter with approximately 2,74 year half life. Therefore, its presence in natural systems is limited in time and mainly dependent on nuclear reactor operation. As a rule determination of 55Fe require chemical separation prior detection. For this purposes separation on anion exchange column in two steps is usually used which makes it time-consuming. In addition in last decade improvements of methodology was described in few publications but mainly for its determination in liquid radioactive waste samples. Therefore, the main aim of this paper is shown the way for iron isolation from liquid samples with a high concentration of ions that enable simple determination of 55Fe. It will be discussed iron binding on extraction chromatographic resins developed by Horwitz and co-workers, so called TRU and Ln resin. The methods for concentration and separation from all interfering isotopes on extraction chromatographic column which enables rapid and simple determination will be proposed. It will be shown how Fe can be easily separated from great amounts of macro elements, alpha and beta emitters on column filled with TRU or Ln resin by using HCl and/or HNO3 in one step. The advantages and disadvantages of using of Ln and TRU resins will be discussed. After the isolation, activity of 55Fe is determined by counting on the liquid scintillation counter by using quench correction curve. So it will be described which type of quenching mainly influences on accuracy of determination. Type of polynomial approximation for efficiency determination (and quench correction) in sense of minimization of determination error will be proposed. Budget of uncertainty of determination will be discussed.

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