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# Development and validation of robust analytical method for determination of Cr-51 in blood samples by LSC

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Cr-51 is a radioactive isotope of chromium having a half-life of 27.7. The decay scheme indicates that 91% of the time, Cr-51 decays by electron capture directly to the ground state of the V-51 and emitting no gamma rays at all. Only 9% of the time the Cr-51 decays directly to the excited state of the daughter (V-51m), which then further decays by isomeric transition to the ground state, emitting a 320 keV gamma ray during the process. At the present, Cr-51 is used in many application fields, in particular, in medicine, where, thanks to its chemical properties, Cr-51 has found to be an excellent tool for the labeling of red blood cells in order to measure of mass or volume, survival time, and sequestration studies, for the diagnosis of gastrointestinal bleeding, and to label platelets to study their survival [1].
Nowadays, for the determination of C-51 activity in blood samples, usually, the conventional ⍰-spectrometry is applied [2]. In spite the fact that the method utilise almost no (or minimum) sample preparation steps, the careful attention for the calibration geometry should be paid. For instance, the calibration should be performed with the homogenised calibration standard (that is by blood samples is not always easy). On the other hand, the limit of detection, achieved by ⍰-spectrometry (depending on the type of detectors) are normally in the range of 10 Bq/g and relatively long counting times are required. However for some clinical studies, where the incorporated doses are sometimes restricted, a method with better detection capability would be absolutely preferable.
Because of the electron capture decays the Cr-51 could be also detected using the Liquid Scintillation Counting [3]. Due to its simplicity, sensitivity and relatively simple sample preparation, this method was proved to be a suitable alternative for ⍰-spectrometry in order to determine the Cr-51 in blood samples.
To prove this in the present study we developed a robust analytical method for measurement of Cr-51 in blood samples in routine mode by means of LSC. The method was validated with the synthetically prepared blood samples from different subjects. Prior to the measurements the samples were microwave digested in order to eliminate the matrix influence. The figures of merits, such as sensitivity, limits of detection and quantifications, precision and accuracy were studied and confirmed the capability of the method to determine the Cr-51 in blood samples in the range of 0,5 Bq per g of sample.
All the results will be presented and discussed in details in the frame of current poster presentation.

1. Vandermeulen, E, et al. (2010). "Determination of optimal sampling times for a two blood sample clearance method using Cr-51-EDTA in cats ". Journal of Feline Medicina and Surgery 12: 577
2. Moreira D, et al. (2009). Determination of Cr-51 and Am-241 X-ray and gamma-ray emission probabilities per decay. Applied Radiation and Isotopes 68: 596.
3. Sheppard, G (1971), The Simultaneous measurements of Cr-51 and C-14 by Liquid Scintillation Counting International Journal of Applied Radiation and Isotopes, 22: 125

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