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Status of low-energy AMS detection of Iodine-129 at CNA: performance and background correction

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^{129}I ($T_{1/2} = 15.7\text{My}$) is present in all environmental compartments and has a very conservative behaviour in water. Its presence in the environment is mainly due to the nuclear fuel reprocessing plant discharges, whose history is relatively well-known. These characteristics make it an excellent hydrological tracer. For this and other applications, ^{129}I is one of the radionuclides most frequently measured by Accelerator Mass Spectrometry.

^{129}I measurements are routinely performed at CNA (Sevilla, Spain) by a 1MV AMS system manufactured by High Voltage Engineering Europe (HVEE, The Netherlands) in 2005. Charge state selection after acceleration has evolved from 4+ to 3+ and now to 2+, especially after the stripping gas change from Ar to He, which has provided a strong increase in the accelerator transmission up to more than 40% in this last charge state. The instrumental background level has not changed sensitively after the last stripper gas and charge state selections, showing typical isotopic ratios of $^{129}\text{I}/^{127}\text{I} = 2 - 3 \times 10^{-13}$. This background is caused by different effects, including contamination and interference from neighbouring isotopes as ^{127}I . The influence is especially relevant when measuring samples with low $^{127}\text{I}^{2-}$ currents, as the contamination makes the isotopic ratios increase. In order to carry out a complete subtraction of the background, a double correction is carried out at CNA, based on the continuous analysis of instrumental blanks with different AgI/Nb proportions, which present a range of I^- currents and isotopic ratios. In this presentation, the different experiments performed for the measurement optimisation as well as the background subtraction procedure will be presented.

Student Submission

Yes

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