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Optimisation of a Liquid Scintillation counter for low-level measurement of Lead-210

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Lead-210 is a natural radioactive isotope that is commonly used in erosion and sedimentation studies. It may also bioaccumulate through the foodchain, which has implications for human ingestion dose assessment and assessment of radiation doses to biota. While analysis via gamma spectrometry is the method of choice for most sediments and soils, the ability to measure low levels of lead-210 is important for many environmental applications, particularly where analyses are required in media such as surface waters or biota tissues. Liquid scintillation counting (LSC) is a popular method for analysis as it enables direct and quick measurement of the beta particle emission of lead-210. This has an advantage over low-level methods that require long waiting times for analysis via the alpha emitting radioactive decay product, polonium-210.

Unfortunately, it is often impossible to reproduce published radioanalytical methods, including those for analysis of lead-210, without contacting the authors, due to information gaps or a lack of detail essential for method development. In particular, the steps required for method optimisation in a new environment can be difficult to extract from a publication and then reproduce, particularly for small laboratories. In this presentation, the process of optimising the analysis of lead-210 via LSC on a PerkinElmer TriCarb instrument is comprehensively detailed, with an emphasis on making this process accessible and reproducible in other laboratories around the globe.

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