

## OPTIMIZATION OF METHODOLOGY FOR THE DETERMINATION OF GROSS ALPHA AND BETA ACTIVITY IN WATER BY LSC

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The approach taken in the WHO Guidelines for controlling radiological hazards in public water supplies has two stages. The first is an initial screening for gross alpha and beta activity to determine whether the activity concentrations (in Bq/litre) are below levels at which no further action is required; and if these screening levels are exceeded, investigation of the concentration of individual radionuclides and comparison with specific guidance levels. The classical approach consists of evaporating a known volume of water and measure the activity of the residue in a glass flow proportional counter. An attractive alternative to classical methods is the ultra-low level liquid scintillation counting (LSC) coupled to alpha–beta discrimination, which allows a rapid and simple determination of gross alpha and beta activities, which are simultaneously measured. This paper aims to establish the best experimental conditions to determine gross alpha and beta activity in water by LSC, using a 1220 Quantulus™ Ultra Low Level Liquid Scintillation Spectrometer. Two scintillation cocktails were used, Ultima Gold AB and Optiphase Hisafe 3, mixed with the sample in three different ratios: 10/10, 08/12 and 05/15. The following parameters were studied: Pulse Shape Discrimination (PSA), efficiency, Minimum Detectable Activity (MDA), Figure of Merit (FOM) and Factor of Merit (FM). The best PSA obtained was 90 for all the combinations of cocktails. The verification of the efficiency was performed by measuring standard solutions. The best performance was achieved by using the scintillation cocktail Ultima Gold AB with the ratio 08/12 and by using the Optiphase Hisafe 3 with the ratio 05/15.