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Gross Alpha/Beta Measurements in Drinking Water Samples Using Different Methods

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Abstract: Natural radionuclides generally represent the main source of radiation exposure to the public. In the environment, they either arise from the direct release of Radon from ground into ambient air or through dissolution of U-and Th-series members into water. As a consequence the control of natural radionuclides in water for human consumption has become a major goal worldwide during the recent decade. Limitations were set and the need for simple and rapid procedures for their implementation becomes necessary. Liquid scintillation techniques provide the detection and quantification of alpha and beta emitters in aqueous sample. Liquid Scintillation Counter (LSC) techniques using Pulse Shape Discrimination (PSD) allow counting of alpha and beta radiation in the same sample simultaneously. In this study, Packard Tricarb 3170 TR-SL LSC has been used. Ultima Gold LLT produced by Packard Instrument Company was used as the liquid scintillator. The optimum counting parameters and Pulse Shape Discrimination (PSD) settings were provided for the best alpha and beta separation. PSD was verified by counting a pure alpha Am^{241} and a pure beta Cl^{36}. Spill of beta in alpha and alpha in beta was found around 0.1% at the optimum discriminator setting of 128. The counting efficiencies were 100% and 95% for alpha and beta counting respectively. Water samples were pre-concentrated before the measurements. Abanian maximum permissible level for gross alpha radioactivity is 0.1 BqL^{-1} and 1 BqL^{-1} for gross beta radioactivity in drinking water. LSC method results were compared with the Gas Flow Proportional Counter.

***Key Words*:** Liquid scintillation counting, Calibration, Water sample, Alpha activity, Beta activity.

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