

Standardization of Tritium Water by CIEMAT/NIST Method and TDCR Method

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Tritium is a low-energy pure beta radionuclide, and its average energy is about 5.72keV. Tritium water is measured by CIEMAT/NIST (C/N) method with ⁵⁴Mn as tracer, because ⁵⁴Mn activity can be accurately measured by 4 π β - γ coincidence method and the energy of Auger electron and X-ray is about the same as tritium. Moreover, tritium water is also measured on the new TDCR system constructed in China^[1]. The system highest efficiency of tritium water in Ultima Gold LLT is 54%, and the background is about 1.3s⁻¹ and 1.6s⁻¹ for triple coincidence and double coincidence, when the TDCR liquid scintillation counter places in lead shielding. The measured results show good consistency with relative standard deviation of 0.17%. And the discrepancy between C/N and TDCR method is 0.78%, when the kB value of Ultima Gold LLT is chose as 0.0075cm/MeV for C/N method and 0.012 cm/MeV is determined by TDCR method.

References.

[1] WU Yongle, Liang Juncheng et.al, 2012. Standardization of Tritium water by TDCR method, Plasma science and technology Vol14.7