

ENRICHMENT OF TRITIUM IN WATER BY ELECTROLYSIS FOR LOW LEVEL TRITIUM
ACTIVITY MEASUREMENT

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For low level tritium activity measurement in water, lower than 40 TU (1TU=3.2×10⁻¹²Ci/l), the tritium enrichment by electrolysis is used. When water is electrolysed hydrogen is given off more readily than tritium. The relative loss rates are defined by

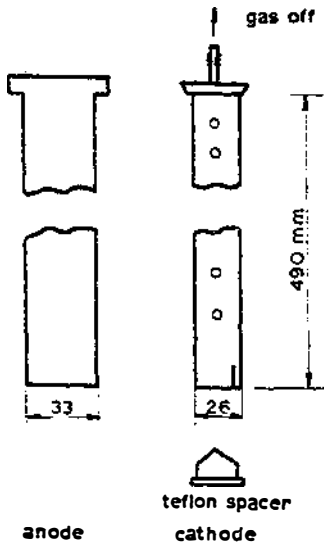


Fig. 1

temperature and nature of electrolyte /1/. The electrolysis cell is shown in Fig. 1. The electrodes are of stainless steel tubes. Initial distilled sample volume is 250 ml where 1 wt% of Na₂O₂ is added. The total current used is 700 A.h over the 4-day period at 0°C. Final volume is 25 ml and enrichment factor is about 10. Tritium recovery is 80%.

Reference: /1/ Taylor C.B. Proc. - International Conf.on Low Rad. Meas. and Appl. High.Tatras, Czechoslovakia, 1975.

/2/ Cammeron J.F. Payne B.R.- Proc.sixst Int.Conf.Radio-carbon and Tritium Dating,Conf 650625 Chem.(1966)454.

$$\frac{dn_p}{n_p} = \beta \frac{dn_t}{n_t}$$

n_p and n_t are numbers of molecules of protium and tritium. If a volume V_0 of water containing initial concentrations n_p^0, n_t^0 is electrolysed to a final volume V , since $n_p \gg n_t$, the initial and final concentrations of tritium T_0 and T are given by

$$f = \frac{T}{T_0} = \left(\frac{V_0}{V} \right)^{\frac{\beta-1}{\beta}}$$

f is called the enrichment or concentration factor. Separation factor β varies with electrode material, temper-