

Counting low level ^3H water samples with 300 SL

Introduction

The method below describes how to count low level ^3H samples, using ROI of 25% efficiency. Constant quench level is assumed.

Materials and methods

Vial: 20 mL plastic vial

Scintillation cocktail: AquaLight uLLT

Sample composition: 9 mL water, 12 mL AquaLight uLLT, called henceworth 9+12 sample.

Procedure

1. Calibration

Calibration counting with H-3.

- Prepare an active 9+12 sample containing H-3. DPM needs not be known but take care that it yields 1000 – 500 000 CPM.
- Count in wide H-3 ROI 5-350, taking CPM, TDCR and spectrum.
- Calculate $\text{DPM} = \text{CPM} / (1.06 * \text{TDCR})$. [Factor 1.06 originates from the fact that at these quench levels efficiency is about 1.06 times higher than TDCR].

Finding ROI of 25% efficiency.

Analyze the H-3 spectrum in Report Render. Inspect ROI's 5-100, 5-110, 5-120... and select the one which gives 25% efficiency, i.e. where $\text{CPM} = 0.25 * \text{DPM}$. Typically it is near 5-120 and called henceworth ROI25.

2. Counting test samples

Counting background sample.

Set ROI25, count 9+12 background sample, recording CPM in ROI25, named bgCPM. Counting time should be as long as possible (1000 min or higher) to ensure well-known background.

Counting test samples.

Set ROI25 and counting time 1000 min. Record CPM.

Results

Calculate:

$\text{DPM} = (\text{CPM} - \text{bgCPM}) / 0.25$, or

$\text{Bq/L} = (\text{CPM} - \text{bgCPM}) / (0.25 * 0.009 * 60)$

Product Information