

consists of a scintillation counter having a hollow type plastic scintillator and a thin G. M. tube located in the hollow of the scintillator in such a way that the G. M. tube is covered by the scintillator with sufficient thickness. The sample to be measured is placed under the G. M. tube. It is essential that β -rays from the sample should be able to penetrate through the G. M. tube without appreciable energy loss and enter the scintillator. The detector is shielded by massive shielding material.

Using the coincidence technique, signals of the scintillation counter are recorded in a pulse height analyzer only when the G. M. counter responds simultaneously. β -particles emitted from the sample trigger both detectors and are recorded in the pulse height analyzer, but most of the background counts of the scintillation counter caused by γ -ray are not recorded.

Although μ -mesons in cosmic rays which cross the G. M. tube may be registered in the coincidence analysis, these counts can be easily distinguished from the sample counts, because their pulse heights are higher than a certain value determined by the minimum wall thickness of scintillator.

The background counting rate was about 0.09 cpm in the case of Na measurement, and detection efficiency was about 13%. The background has been quite stable and its variation has obeyed the statistical law. The measuring disc sample was prepared in following ways; the blood sample was separated by the use of a centrifuge and the serum of 0.2 cc was taken in a steel-made 2" planchet covered by tissue paper for dryness. The minimum detectable amount of ^{22}Na , defined as 3 times the standard deviation of the background, was about 0.1 μCi in a 10 hr. measurement.

The Direct Counting Method of Tritium-tagged Compounds in Blood with 2π Gas-flow Counter

S. Ito

Department of Pediatrics, Nagoya University School of Medicine, Nagoya

The liquid scintillation spectrometer is the most useful instrument for measuring Tritium-tagged compounds. But the quenching phenomenon by chemical or colorful substances disturbs measurement in the biological materials like serum or urine.

Two- π gas-flow counter is readily available for such purposes.

One ml. of 10 times diluted plasma (or serum) with 0.9% saline directly pipetted into planchet and dried sufficiently with gentle manipulations, then we find infinitely thick samples showing specific radial structures with relatively smooth surface.

These samples show sufficient reproducibility ($\pm 2.5\%$). But we must estimate the dried residue of 0.9% saline as about 0.64 mg/ml to consider the self-absorption because of their special structures.

The main sources of errors in this method are "charge effect" and insufficiency of gas-flushing.

When we repeat the measurements at least twice, "charge effect" can be recognized with abnormally decreasing counting rates, and flushing insufficiency is found from abnormally increasing counting rates. If such undesirable results are found, we must reject them and repeat again.

Efficiency of this method at just infinite thickness is about 2.5 percent.

In spite of such low efficiency, relatively large maximal permissive doses for man allow us precise measurements of Tritium-tagged compounds in blood with 2π gas-flow counter.

This method is well applicable for many other experiments.