

§8. Removal of Impurities from Environmental Water Samples for Tritium Measurement by Means of Liquid Scintillation Counter

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Liquid scintillation counting is now the most popular method to measure the tritium concentration in the low level water sample such as environmental water samples. However, it takes much time with a lot of doing to distill off the impurities in the sample water before mixing the sample with the liquid scintillation cocktail. In the light of it, we investigated the possibility of an alternative method with membrane filters for purification.

In Japan, measurements of tritium concentrations in the terrestrial and subterranean water and rainwater are now carried out in many laboratories by means of the official tritium analyzing method. According to the method, distillation is essential to avoid misestimation caused by quenching, chemical luminescence and other radioactive substances[1]. However, because of the following four reasons, a possible alternative using the membrane filter was investigated.

- [a]. The distillation method takes much time and labor to distill off and wash out the used utensils.
- [b]. Such substances as those which have lower boiling points and not very higher ones than boiling point of water can hardly be removed because you need to heat enough to vaporize the water thoroughly.
- [c]. Generally you have scarcely any quenchable substances in the environmental water samples.
- [d]. Scintillation cocktail as known a non-quenching liquid has been on the market lately.

As the result, the filtration method was proved to be available to be alternatively used for tritium measurement. We also tried to apply the filtration method, when we concentrate the water sample using the electrolysis enrichment apparatus. We found out that the method was also available to use before and after the enrichment[2].

Table 1, Comparison of Filtration Methods

Filtration Method	Filtration Limit [nm]
Micro Filtration	100
Ultra Filtration	10
Nano Filtration	1
Reverse Osmosis	0.1

Comparison of Removal Methods for Tritium Enrichment

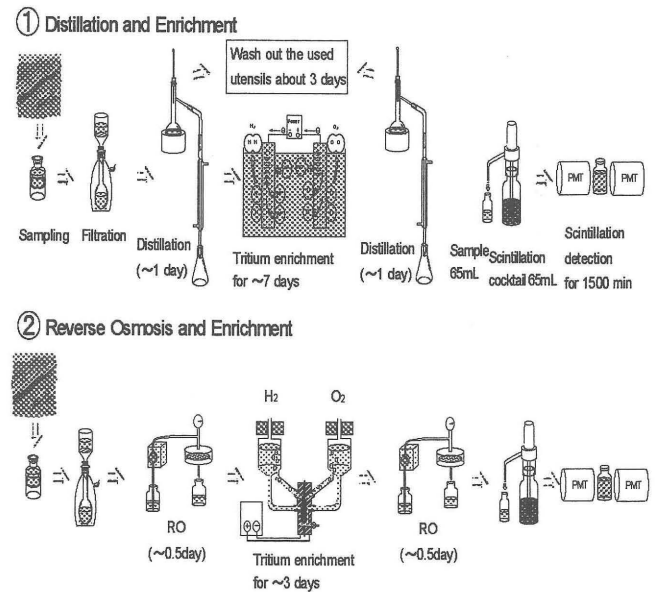


Fig.1 Comparison of Removal Methods for Tritium Enrichment

References

- [1] Radioactive Measurement Series Volume 9 "Tritium Analyzing Method", Science and Technological Agency of Japan (1997).
- [2] SAKUMA Y. et al, Proc. IRPA10, P-4a-248 (2000)