

§8. Collection of Environmental Samples and Measurement of Tritium and Studies of Environmental Tritium Using Deuterium Oxide (1995)

Ichimasa, Y. , Ichimasa, M. (Ibaraki Univ. Sci.)
Sakuma, Y.

Hydrogen is one of the major elements to construct organisms and distributes in such biomolecules as proteins, carbohydrates, lipids and nucleic acids. The isotopes of hydrogen are deuterium and tritium. Although their effects on a living body are different and, for an extreme case, it is known that high concentration (about 50%) of deuterium oxide (D₂O) causes inhibition of plant growth, low concentration of D₂O is expected to be a suitable tracer in the environmental studies of tritium and it is desirable to use deuterium, as well as possible, instead of tritium to estimate rates of its incorporation into a living body via food chain when tritium was released in the environment. In this study, we intended to

devise a mini chamber system for environmental studies of tritium and deuterium to elucidate whether behavior of tritiated water or tritium gas in the environment is the same as that of deuterium water or deuterium gas or not from a standpoint of the estimation of radiation dose of tritium. The system consists of two parts, one is a mini chamber for a miniature environment and the other is a tritium elimination system. The temperature (15-40°C), humidity (40-80%) and luminous intensity (10000-30000 lux) in the mini chamber are controlled. The tritium elimination system contains a cold trap for tritiated water and deuterium water, and a column of Hopcalite, cold traps and molecular sieves for oxidation and recovery of tritium gas and deuterium gas. Two tritium monitor are used in both parts, respectively. Figure 1 shows the outline of a mini chamber system.

