

§4. Measurement of Radon Exhalation Rate from Walls

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Radon (^{222}Rn) is one of radioactive nuclides in the natural environment, which emanates as an inert gas from the ground and concrete walls of building. The concentration of radon will be high in a heavily shielded laboratory with low ventilation rate, such as in a building for nuclear fusion experiments.

It is expected to develop a method for measuring air exchange rate in an experimental hall by means of radon observation. In order to get to the goal, it is necessary to evaluate factors of time variation of radon exhalation rate, and to develop a method for directly measuring radon exhalation rate from walls. In the present work, the latter one was done. The method was applied to the room No.1231 of NIFS.

The measuring method of exhalation rate is as follows. Some area of wall is covered with cylindrical accumulation chamber, 300 mm in diameter, 74 mm in depth. The emanated radon from wall is accumulated in the vessel. After 1 hour, the air in it is sampled to PVF bag. The radon concentration in the sample is measured by 1.5 liter ionization chamber. Radon exhalation rate from wall is calculated from the area covered

wall, the volume of the vessel, accumulation time and radon concentration in the sampled air.

Samples from nine points on walls were measured for evaluating radon exhalation rates. The data ranged $2.0 \sim 10.2 \text{ Bq m}^{-2} \text{ h}^{-1}$. Values obtained on a 200 mm thick wall without crack were $6.6 \sim 9.0 \text{ Bq m}^{-2} \text{ h}^{-1}$.

Radon concentration in the room is mainly governed by air exchange and radon exhalation from walls. Radon exhalation rate from walls can, therefore, be estimated from the measured radon concentration if the air exchange rate is known. The radon exhalation rate measured by direct method has been found almost the same as estimated value from air change rate and radon concentration in room air. This suggests a possible inverse way that air exchange rate in a room may be estimated from radon data, i.e., radon concentration in room air and radon exhalation rate from walls by using the method in the present study.

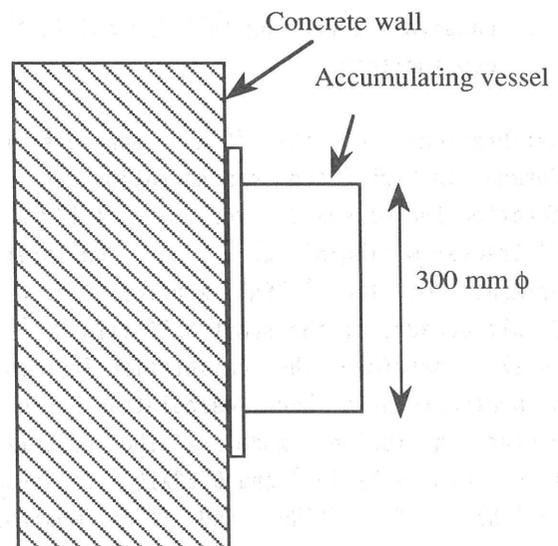


Fig. 1 Method of accumulating radon which emanates from wall