

## §6. Effect of Humidity on Radon Exhalation Rate from Concrete

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The experimental hall for nuclear fusion experiments is required to keep airtight in order not to leak airborne radioactivities which are induced by neutrons. It is necessary to monitor air change rate and air quality in that room. Tracer gas methods are generally applied for measuring method of air change rate. We have investigated measuring method of air change rate using radon ( $^{222}\text{Rn}$ ) as a tracer gas, because the concentration of radon will be high in a room with low air exchange rate. Radon concentration in a room is mainly governed by air exchange and radon exhalation from walls. The variation pattern of radon concentration can be roughly reproduced with the air change rate. 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.

The objective of the present study is evaluation of seasonal humidity effect on radon exhalation rate from concrete. Figure 1 shows the system of controlled humidity environment. Three sealed boxes are placed in a container whose temperature is controlled  $30\text{ }^{\circ}\text{C}$ . In each box, concrete piece

whose size is 15 cm diameter and 5 cm thickness has been set. They have been exposed in three different fixed humidity circumstances for about a year. The three fixed humidity are selected 3, 10, 25  $\text{g m}^{-3}$  in absolute humidity, those correspond to dry condition as control, winter and summer, respectively. Radon exhalation rate from each concrete piece is measured every one month during humidity exposure.

Figure 2 shows the result. Under the lower humidity, radon exhalation rate from concrete is small. On the contrary, radon exhalation rate is large in the higher humidity circumstance. This trend is consistent with the seasonal variation of indoor air radon concentration in low air-exchange-rate room. Since the aim of this experiment is to evaluate effect of long term humidity exposure for radon exhalation rate, it is expected to obtain continuous data.

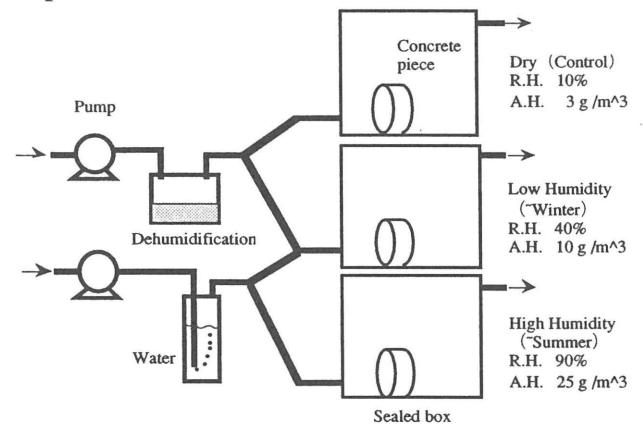


Fig. 1 Humidity exposure system

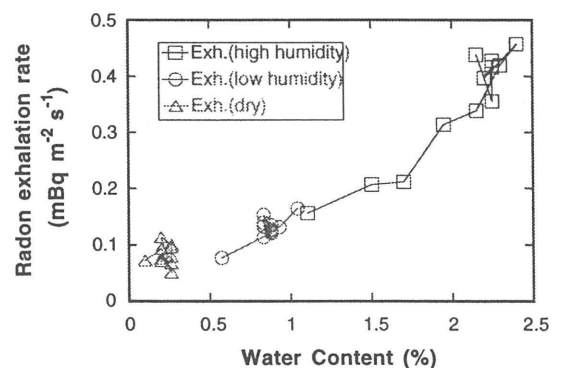


Fig. 2 Rn exhalation rate and water content