

### §3. Measurement of Air Exchange Rate and Radon Exhalation Rate from Walls

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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. However, these methods can not be carried out for very large room, because it is difficult that tracer gas diffuse uniformly. Therefore, 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. In the present work, the latter one was mainly done. The method was applied to the room No.1231 of NIFS.

The air change rate was estimated from direct

measured value of indoor radon concentration and exhalation rate. The indoor radon concentration is fluctuating sharply. If indoor radon data is used intact, the estimated air change rate gives sharp fluctuation. Therefore, smoothed radon data which was averaged for 11 hours data before and after was applied to estimation. Figure 1 shows the comparison between measured air change rate by CO tracer gas method and estimated one. When the radon exhalation rate from wall is assumed to be  $7.5 \text{ Bq m}^{-2} \text{ h}^{-1}$ , the estimated air change rate can be reproduced not only the level of air change rate but also its variation. On the other hand, If  $5.7 \text{ Bq m}^{-2} \text{ h}^{-1}$  is assumed, variation pattern of air change rate can be well represented. But the level is not consistent with the measured one, especially in the first quarter period.

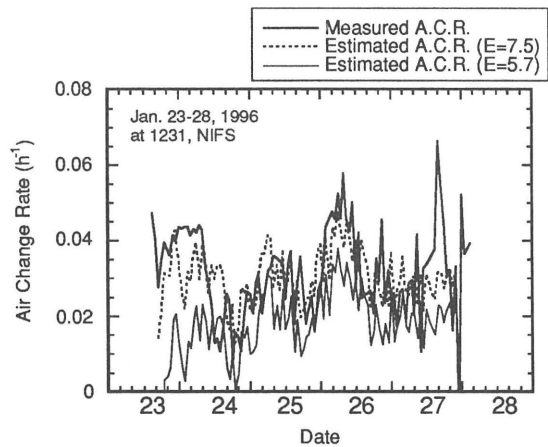


Figure 1 Comparison between measured and estimated air change rate.

The variation of air change rate can be monitored by means of this method, but it is difficult to obtain the level accurately. This method can be applied only to a room where is high radon concentration, small inflow of radon, small variation of indoor radon and air exchange.