

Chemical forms of radioactive Cs in recent airborne particulate matters in Japan

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The Fukushima Dai-ichi Nuclear Power Plant (FDNPP) accident in March 2011 resulted in release of a large amount of radioactive materials into the atmosphere. As a result, the radioactivity in atmospheric samples in the East Japan increased drastically after the accident. Although the radioactivity decreased gradually since the accident, it is still higher than the level before the accident, mainly contributed by radioactive Cs. It is thought that the recent main source of the radioactive Cs in the air is resuspended soil dusts. However, a possibility of the existence of other sources of radioactive materials in the air after June 2011 was suggested [1]. In this study, we discuss chemical forms of radioactive Cs in airborne particulate matters (APM) using the results of sequential extraction experiments conducted on APM samples collected near Tokyo.

The weekly APM samples collected with a high volume air sampler at Kawasaki City, Kanagawa, located 242 km south-southwest from the FDNPP, were subjected to this study. First, the contents of radioactive Cs (¹³⁴Cs and ¹³⁷Cs) in the APM samples were determined by gamma-ray spectrometry. We then performed the four-steps sequential extraction using Milli-Q water with ultrasonic vibration, Milli-Q water with shaking, 1 M ammonium acetate, and 0.11 M acetic acid in this order as extractants on the selected APM samples. The contents of radioactive Cs in the supernatants were determined by gamma-ray spectrometry.

The results of the extraction experiments reveal that more than 50 % of radioactive Cs was extracted with Milli-Q water with ultrasonic vibration (the first step) from the APM samples collected between September 2011 and August 2012. In the case of contaminated soil samples due to the FDNPP accident, Milli-Q water extracted practically no Cs from the soils; only extractants containing ammonium salts could partially extract Cs [2]. Those results suggested the existence of sources of radioactive Cs in the APM samples other than the resuspended soil dusts.

[1] Hirose K. *Appl. Radiat. Isot.* **81**, 325-329, 2013 [2] Hirose M. Abstracts in APSORC 13 5th Asia Pacific Symposium on Radiochemistry, 125, 2013