Comparison of isotope fractionation between total and speciated mercury in the atmosphere using two collecting methods

JAESEON PARK[1], MIN-SEOB KIM[1], HYUN WOO PARK[1], HYEN-MI CHUNG[3], JONG-WOO CHOI[1*]

[1]Environmental Measurement&Analysis Center, NIER, Incheon 22689, Rep. of Korea
[2]Monitroing and Analysis Division, Wonju Regional Environmental Office, Wonju 26461, Republic of Korea
[3]Fundamental Environment Research Department, NIER, Incheon 22689, Rep. of Korea
jspark0515@korea.kr, candyfrog77@gmail.com, rhloves87@korea.kr, hyenmic@korea.kr, cjw111@korea.kr

Mercury (Hg) is a toxic pollutant to human and wildlife. Atmospheric Hg plays a important role in the transport and transformation of global Hg cycle emitted from natural or anthropogenic sources, and Hg isotopic ratios provide a fingerprint of various Hg sources for tracking Hg sources. We examined the two collection methods of gaseous Hg for stable isotope. First, we used a carbon trap for collecting total gaseous Hg and desorbed Hg from active carbon by two furnace system. Desorbed Hg was collected in 1 % $KMnO_4$/ 10 % H_2SO_4 solution. Second, Ontario-Hydro (impinger collection) method was modified for speciated gaseous Hg (Hg(II), Hg(0)). Gaseous Hg was generated by spiking Hg isotope standard reference material (NIST SRM 3133) to $SnCl_2$ solution. It was developed high recovery rate and low mass variation at 10 L/min flow rate of Ontario-Hydro method, but the results showed that mass fractionation would be occurred during mercury collection depending on collection condition such as flow rate and Hg concentration. Our study suggests that the conditions of collection methods should be optimized to improve the recovery rate and minimize the mass fractionation of total and speciated Hg isotope.