

Nitrogen isotope composition of dissolved nitrate and chemical characteristics in wet deposition of Seoul, Korea

YEONGMIN KIM¹, INSUNG LEE² AND JONG-SIK RYU³

¹School of Earth and Environmental Sciences, Seoul National University, Seoul, South Korea (galgari1@snu.ac.kr)

²School of Earth and Environmental Sciences, Seoul National University, Seoul, South Korea (insung@snu.ac.kr)

³Division of Environmental and Material Sciences, Korea Basic Science Institute, Chungbuk, South Korea (jsryu@kbsi.re.kr)

Nitrogen isotope of dissolved nitrate and chemical composition of major cations and anions were measured to track the source of nitrogen and identify the characteristics of precipitation in Seoul, Korea. Average nitrogen isotope value ($\delta^{15}\text{N}$) is 1.7‰, ranging from -1.5‰ to 6.5‰, indicating that the dominant source of nitrate in precipitation of Seoul appears to be anthropogenic activities. Emissions from fossil-fuel combustion, vehicles and stationary sources are strongly associated with the trend of nitrogen isotope value in this study. Average concentrations of major cations and anions in precipitation show that SO_4^{2-} and NO_3^- are the most abundant followed by Cl^- . NH_4^+ , Ca^{2+} and Na^+ are abundant cations. The enrichment factors ($\text{EF}_{\text{seawater}}$) relative to seawater reveal that SO_4^{2-} (76.7), Ca^{2+} (109) and K^+ (34.7) are partly originated from other sources in addition to marine source. Compared to them, Mg^{2+} (2.99) and Cl^- (1.44) are mainly derived from marine source. NO_3^- concentration is well correlated with that of SO_4^{2-} , indicating that they are derived from anthropogenic activities. The $\text{NH}_4^+/\text{NO}_3^-$ ratio of this study ranges from 0.7 to 3.8 with the average of 1.5, suggesting higher strength of nitrate than that of ammonium in wet deposition of the study area. Strong correlation between nitrate and ammonium indicates that they are derived from industrial activities.