Air Concentrations and Enrichment Factors for Ten Toxic Elements at Seoul and Daejeon in Korea

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Air quality in urban areas is one of the most important environmental issues and air particulates consisting of various elements from both artificial and natural origins is an indicator of an air quality. Especially, toxic elements in fine air particulates can be accumulated in the lungs by inhalation and incur serious harmful effects to human health. PM10 and PM2.5 air particulate samples were collected by using high volume samplers (HiVol 3000, Ecotech, Austria) and quartz filter(8 x 10 inches) at two different sampling sites (Seoul and Daejeon) in Korea during the spring season, 2019. Instrumental Neutron Activation Analysis (INAA) was applied for quantitative analysis of the trace elements in the PM10 and PM2.5 samples. 4 blank filters and 68 samples (17 samples for PM10 and PM2.5 at Seoul and Daejeon) were analyzed. 24 elements in the blank filters and 32 elements in the samples were determined by INAA. The concentrations (ng/m^3) of ten toxic elements such as As, Ba, Br, Cl, Cr, Fe, Mn, Sb, V and Zn which have acceptable analytical quality, were calculated with air flow volume and their average concentrations were evaluated for 17 samples. As expected, most of elemental air concentrations in Seoul samples were higher than those in Daejeon samples, except for As and Cl. Fe shows the highest concentration level ($0.81 \sim 2.19$ µg/m^3) among ten toxic elements, and As, Sb and V have a simliar concentration level ($2 \sim 10$ ng/m^3). In addition, encrichment factors were calculated on the basis of Sc concentration in earth's crust. Enrichment factors of As, Br, Cl, Sb and Zn were higher than 100 and it can be interpreted that their origin is artifical. In the future study, making more data is necessary for various purposes such as epidemiological studies, source identification and apportionment.
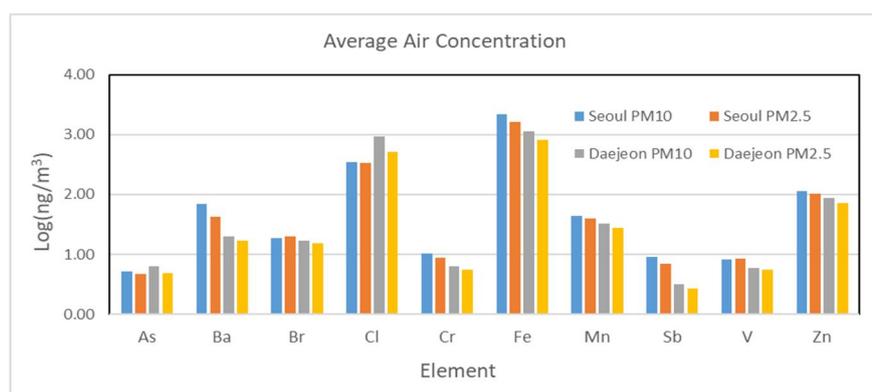
Fig. 1. Average air concentrations for 10 toxic elements.