

3.097 Evaluation of volatile property of ammonium nitrate on filter using denuder filter pack system.

Early Career Scientist

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Abstract:

In recent years, the air pollution of the fine particulate matter ($PM_{2.5}$) has been concerned in East Asia. In order to know the sources of $PM_{2.5}$, it is necessary to investigate not only mass concentration but also its chemical components. Acid Deposition Monitoring Network in East Asia (EANET) has accumulated long-term data of aerosol components observed by the filter pack method. The dataset possibly contributes the measures for $PM_{2.5}$. However, it is known that the filter pack method has a negative artifact by the volatilization of semi-volatile particles on the filter during the sampling. This study aims to develop the correction method of the artifact of ammonium nitrate (NH_4NO_3) that is one of main components of $PM_{2.5}$. We compared the filter pack with the denuder filter pack system, which can measure $PM_{2.5}$ components without the artifact, and evaluate volatile properties of NH_4NO_3 on the filter.

Parallel weekly measurements of the filter pack and the denuder filter pack system were carried out on an observation tower in the Field Museum Tamakyuryo (FM Tama) located in western suburb of Tokyo. Both methods measure NO_3^- , NH_4^+ and other inorganic ions in aerosols; gaseous HNO_3 and NH_3 . From the results, we calculated gas ratio ($HNO_3/(NO_3^-+HNO_3)$ and $NH_3/(NH_4^++NH_3)$). The gas ratio of the filter pack method was larger than that of the denuder system due to the artifact effect. Clear seasonal variation of the gas ratio was found in HNO_3 . Moreover the gas ratio of the denuder system correlated with some meteorological elements especially temperature and humidity. Therefore, the gas ratio was well reproduced by a multiple regression equation using these meteorological elements. The gas ratio calculated by the equation could be applied for the correction of the artifact of the filter pack method.