Characteristics of mineral aerosol collected at Asian dust source regions in China

S. YABUKI[1], S. KANAYAMA[1,2], M. MIKAMI[3], F. YANAGISAWA[4], F. ZENG[6], L. LIU[5], M. LIU[6] AND Z. SHEN[5]

[1]The Inst. Phys. Chem.Res., Japan (syabuki@riken.go.jp)
[2]The Univ. Tokyo, Japan (kanayama@postman.riken.go.jp)
[3]Meteorol. Res. Inst., Japan (mmikami@mri-jma.go.jp)
[4]Yamagata Univ., Japan (ihasa@clubaa.com)
[5]Xinjiang Inst. Ecol.Geograp. CAS, China
[6]Cold Arid Regions Environ.Eng. Res. Inst. CAS, China

Introduction

In order to obtain a better understanding of the physical and chemical characteristics of soil-derived mineral aerosols, aerosol samples were collected at four observation stations in the Asian dust source regions, Qira and Aksu at south and north of Tarim Basin, Dunhuang in He-Xi Corridor and Shapotou, south-eastern periphery of Tengger Desert. We installed high-volume air-samplers (Sibata HV1000F) for bulk aerosol sampling and low-volume air-samplers of the Andersen type (Sibata AN200) to obtain size-segregated information. Dry depositions are also collected at Qira and Aksu Stations. Aerosol particle number concentration was measured by using Optical Particle Counter (OPC) at Qira Station.

Concentration of aeolian dust at four observation sites

Mass concentrations of aeolian dust in spring are incomparably larger than other seasons. Among four observation stations, Qira Station shows obviously higher mineral dust concentration (max: 26mg/m^3) than the other areas.

Deposition rate of aeolian dust

Deposition rates of aeolian dust at Qira, max. 25g/m^2/day, are more than 20 times larger than Aksu. Qira area shows high atmospheric concentration and high deposition rate of aeolian dust. Our results show Tarim Basin is one of the most important potential sources of Asian dust.

Aspect ratios of mineral dust

Previously reported aspect ratios of dust-like aerosol are 2.0 (Hill et al., 1984), 1.7> (Nakajima et al., 1989), 1.4 for two dimension and 1.7 for three dimension (Okada et al., 1987) and 1.8 (Michehenko, et al., 1997). Our results from correlation between Andersen sampler (AN200) and Optical Particle Counter (OPC) gave the aspect ratios between 1.4 and 1.6, mainly 1.6. The results of OPC are consistent with those of AN200 in the range of smaller-than-5um-particles diameter**.**

This study was partly supported by Special Coodination Funds of the Minsitry of Education, Culture, Sports, Science and Technology of Japan.

Evaluation of partition coefficient of polychlorinated organic compounds into humic substances using solid-phase microextraction (SPME)

H. YABUTA*, M. FUKUSHIMA, H. ICHIKAWA AND K. TATSUMI

National Institute of Advanced Industrial Science and Technology (AIST), Ibaraki, 305-8569, Japan
*Present address: Department of Chemistry, Tokyo Metropolitan University, Tokyo, 192-0364 , Japan (h-yabuta@comp.metro-u.ac.jp)

It has been known that environmental behaviors of hydrophobic organic pollutants such as polychlorinated organic compounds are controlled in the presence of humic substance (HSs). For the purpose to discuss the relationships between HSs and these chemicals, the partition coefficients (*K*oc) have been evaluated. In this work, we developed a method to determine the *K*oc values of 1,2,3,4,6,7,8-heptachlorodibenzo-*p*-dioxin (HpCDD) into HS using the solid-phase microextraction (SPME).

After the aqueous solution containing HpCDD and HSs was shaken for 48 hours to the equilibration between the two, the unbound species of HpCDD was extracted with the SPME fiber. Subsequently, the concentration ([HpCDD]) was determined by gas chromatography with electron capture detector (GC-ECD).

Figure shows the linear relationships between the concentration of HS ([OC]) and the ratio of [HpCDD] with HS and that without HS ([HpCDD]o/[HpCDD]w). Such relationships can be written as:

$$[\text{HpCDD}]o/[\text{HpCDD}]w = 1 + K\text{oc}[\text{OC}]$$

Thus, the slopes of linear lines can correspond to the *K*oc values. The differences in the values for each HS may reflect to the structural features of HSs. We further applied this method to evaluate the *K*oc values of hexachlorobenzene.

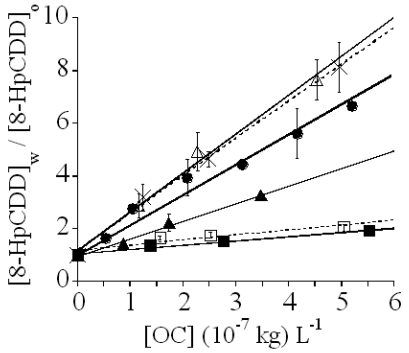

Figure. 1 Relationships between [OC] and [8-HpCDD]$_o$ / [8-HpCDD]$_w$ and determined by SPME-GC-ECD. Humic acids (● , □ , × , ▲), Fulvic acids (■ , □).