

Diagnosis of urban atmosphere in Hanoi city, Vietnam — Observation of VOCs and analysis of pollutant sources —

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1. Introduction

In Vietnam, the population is increasing sharply and air pollution is becoming more serious. Concentration of some species of air pollutants exceeds the Japanese environmental standard value. In Hanoi city, a number of motor cycle is increasing. However, exhaust gas regulation in Vietnam has not been at the same level as developed countries. The purification function of the exhaust gas of the motorcycle and auto mobile are not developed. On the other hand, recent research suggests that biomass burning is one cause of air pollution. In Vietnam, biomass burning occurs frequently in the early summer to burn the rice straw. Rice is the main grain of Vietnam. Thus, it is suggested that there is a source of a serious effect on air pollution in Vietnam. Nevertheless, observation sites for air pollution are very few, and VOC is not included in the measurement item. Also, in the past research VOC has not performed much accurate measurement. In this study, we conducted VOC sampling by using adsorption tubes to clarify the dynamics of VOC in Hanoi City, Vietnam.

2. Experiments

At the Hanoi University of Science and Technology located in the center of urban, While drying the air with the dehydration mechanism "Nafion Dryer", we sampled the outside air into the adsorption tubes using an auto VOC sampler manufactured by us. We conducted the sampling for nine days from June 20, 2017 to June 28, 2017. In order to investigate the main source of VOC in Hanoi city atmosphere and its contribution rate, we conducted VOC sampling (RS) using a portable pump in the roadway. In addition, we burn rice straw in rice fields in Hanoi City and did VOC sampling caused by biomass burning (BB). After that, we heated and desorbed VOC from adsorption tube, and measured the concentration of each substances by using GC-FID system.

3. Results

As a result of the analysis, we succeeded in quantifying 45 to 50 kinds of VOC for each samples. In BB sample, substances such as n-Octane and Styrene were observed as characteristic substances. And in RS sample, substances such as o-Xylene and 1,3,5-trimethylbenzene were observed as characteristic substances. When we did calculate the contribution rate of VOC source in urban atmosphere, BB contribution rate was 18.3% and RS contribution rate was 81.7%. In recent years, the existence of an unknown disappearance process of peroxidic radicals, which has an important role in the rate of O₃ production in the troposphere, has been suggested. However, this observation period was not consistent with the high season of biomass burning. Therefore, actual BB derived VOC emissions may be greater. This threshold tends to decrease as the abundance ratio of VOC to NO_x increases. Therefore, this threshold may be further lowered due to an increase in VOC. Therefore, in order to more accurately evaluate the present condition of Hanoi city atmosphere in the future, it is necessary to clarify the details of the process of disappearance of this peroxide radical. In addition, it is necessary to continue observation of the VOC which affects the threshold of the process of disappearance of peroxide radicals, including the influence of biomass burning.

