5th International Conference on Fog, Fog Collection and Dew
Münster, Germany, 25–30 July 2010
FOGDEW2010-18

Ozone suppression by dew formation

N. Takenaka, W Shimazaki, Y Sadanaga, and H Bandow

Graduate School of Engineering, Osaka Prefecture University, 1-1 Gakuen-cho, Naka-ku, Sakai-shi, Osaka, 599-8531, Japan
(takenaka@chem.osakafu-u.ac.jp / (+81)72-254-9322)

Dew forms in the night and absorbs water-soluble gaseous substances near the ground surface. Some of the water-soluble gaseous substances, such as nitrous acid and formaldehyde, affect ozone buildup after the sunrise. These gaseous compounds are decomposed by sun light to produce OH radicals. OH radicals affect ozone concentrations. If these gaseous compounds are absorbed in the water droplets such as dew, fog or surface water, and if these compounds in the aqueous phase are decomposed before release into the atmosphere by drying, ozone concentration could be suppressed. We investigated the effect of dew on the ozone buildup by using real air sample. The ambient air was sucking by a pump and divided into two lines. The air in the one line was passed above water droplets and was introduced in a UV transmitting Teflon bag, and the air in the another line was introduced directly into the other Teflon bag without passing through water droplets. Two bags were placed outside and natural sun light was irradiated. After several hours of irradiation, ozone concentrations in two bags were measured. As a result, we found that the ozone production was depressed in the air passing through the water droplets compared to the air which did not pass through water droplets. This could be due to the removals of nitrous acid and formaldehyde by water droplets. The next questions are which compound of nitrous acid and formaldehyde is more effective on the ozone suppression, and is there any other water-soluble compounds to affect ozone concentrations. Now, we investigate the each effect on the ozone buildup, that is, only nitrous acid is removed from the ambient air by using a sodium carbonate denuder. The results will be reported in the conference. In the last conference, we reported that nitrous acid was decomposed when dew dries. However, the fate of formaldehyde in the dew has not been clarified. Therefore, the above results give us some information of the fate of formaldehyde. In the presentation, we will report the effect of dew formation on the ozone concentration by using experimental results, monitoring results and calculation results by a BOX model.