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CHARACTERIZATION OF ORGANICS HAZARDOUS AIR POLLUTANTS IN AN INDUSTRIAL CITY IN TAIWAN

Jiun-Horng Tsai *, Yung-Chen Yao and Hui-Fen Ye

Department of Environmental Engineering, National Cheng-Kung University, Tainan, 70101, Taiwan, R.O.C.

ABSTRACT

Hazardous air pollutants (HAPs) have been evaluated for their health and environmental significance on a targeted in Taiwan until recently. Taiwan Environmental Protection Administration (TEPA) have numerous control strategies aimed at controlling HAPs emissions with the focus largely on volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and selected heavy metals, with some limited work on exposure assessment. This study selected volatile organic compounds (VOCs) as target pollutants to characterize speciation in Kaohsiung, the largest industrial city in Taiwan. Two hours-averaged concentration of airborne volatile organic compounds (VOCs) was conducted by canister during rush hour (7-9 am) and non-rush hour (2-4 pm). The samples were analyzed by GC/MS. Field sampling works were conducted at a traffic station (Chian-kin) and an industrial station (Lin-yuan) during ozone episode days (October, 2003) and non-episode days (July, 2003), respectively. The finding shows that the mean concentrations for VOC in traffic monitoring stations in the ambient air for rush hours (07:00-09:00) ranged from 173.7-403.9μg/m^3. For non-rush hour (14:00-16:00), VOC levels were found in range 32.1-97.6μg/m^3. In industrial stations, VOC concentrations in the ambient air for rush hours ranged from 37.6-360.9μg/m^3. For non-rush hour, VOC levels were found in range 10.7-189.1μg/m^3. Airborne VOCs concentration at the traffic station is higher than those at industrial station regardless of rush hour or nighttime.

The results show that mobile source is the dominant impact source of airborne volatile organics at streetside station in Kaohsiung. The speciation of airborne volatile organics result indicated that the dominant volatile organics species included benzene, toluene, ethylbenzene, m,p-xylene, styrene, and o-xylene in both stations. The species mean concentrations at a traffic station during ozone non-episode days were toluene(7.1μg/m^3), o-xylene(3.8μg/m^3), benzene (2.6μg/m^3), m,p-xylene(2.1μg/m^3), styrene(1.6μg/m^3), and ethylbenzene (0.9μg/m^3). At an industrial station, the mean concentration results were toluene(3.7μg/m^3), o-xylene(2.0μg/m^3), benzene (1.2μg/m^3), m,p-xylene(1.0μg/m^3) , and ethylbenzene(0.2μg/m^3) during ozone non-episode days. The results in ozone

episode days at a traffic station were toluene(144.5μg/m^3), ethylbenzene(27.1μg/m^3), m,p-xylene(13.6μg/m^3), o-xylene(12.4μg/m^3), styrene (3.4μg/m^3), and benzene(1.6μg/m^3). The industrial station results of ozone episode days were toluene(188.3μg/m^3), ethylbenzene (15.4μg/m^3), o-xylene(6.8μg/m^3), m,p-xylene(6.6μg/m^3), styrene (6.1μg/m^3) ,and benzene (5.1μg/m^3).

Key words: hazardous air pollutants, volatile organic compounds, ozone episode/non-episode day, and industrial city