Particle Phase Organic compounds (PAHs and VOCs) at Two Big Cities (Dhaka and Rajshahi) in Bangladesh

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Atmospheric pollution has a significant impact on human health, climate change, agriculture, and ecosystem. Air quality and the climate change is the top most concern of the World Health Organization (WHO, 2019). Bangladesh is a rapidly developing country with kinds of environmental problems. It became the top most country in the world for the human deaths due to environmental pollution, which was accounted about 27% of the total death (Lancet, 207). Only air pollution caused two thirds of these deaths (Lancet, 2017). Dhaka along with Narayanganj and Gazipur are the top ranking cities in the World for the air pollution (WHO, 2014). Volatile organic compounds (VOCs) and poly aromatic hydrocarbons (PAHs) are the major organic pollutants in the atmosphere. Until now there is no information of VOCs and PAHs regarding their occurrences, sources, seasonal variation and health impact in Bangladesh. In this study we have collected particulate matters samples on quartz filters with a low volume sampler at two big cities in Bangladesh (Capital Dhaka and North West City Rajshahi) from January 2015 to February 2019. Individual organic compounds were extracted with acetone and n-hexane from the particulate matter loaded filters. The chemical analysis was done with Gas Chromatography (GC)-Mass spectrometry (MS). The analyzed organic compounds were naphthalene, anthracene, diazinon, deltramethrin, pyrabenxoime, pyrazosulfuran, prophenophos butachlor, propiconazole, cymoxanil, cypermethrin, lamda cyhalothrin, dimethoate, chloropyriphos, carbofuran, metalaxyl, pentane, hexane, propene, isobutene, 1,3-butadiene, dichloroflouromethane, ethanol, benzene, toluene, ethylbenzene, xylene, styrene, 1,2,3trimethylbenzene, isoprene, cyclopentane, and cyclohexane. Positive matrix factorization (PMF) and air mass trajectory analysis were done for source characterization. Health risk assessment and life time cancer risk (LCR)

were determined with US EPA based model. The elevated concentrations of the determined compounds at both Dhaka and Rajshahi were observed; Dhaka values were slightly higher than Rajshahi. The concentrations of determined compounds were higher during the winter months basically December to February and lower during the monsoon period in the month of July. PMF model revealed that the sources of organic compounds in Bangladesh were diesel exhaust, coal and biomass burning, industry and gasoline exhaust. Ethyl benzene, dichlorouflouromethane, 1,2,3-trimethylbenzene have the potential carcinogenic impact.

Key words: Particle Phase Organics, PAHs, VOCs, PMF, Health Risk Assessment

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