

Trend, Chemical Characterization and Emission Sources of Atmospheric Fine Particulate Matters in Bangladesh

Abdus Salam

Department of Chemistry, Faculty of Science, University of Dhaka, Dhaka 1000, Bangladesh

Corresponding author

Email: asalam@gmail.com

Atmospheric pollution has significant impact on human health, climate change, visibility reduction and ecosystem. Fine particulate matters have severe impact on health as they can easily enter into the human system. Bangladesh is one of the top ranked countries in the World for deaths due to the environmental problems (Lancet 2017). Air pollution had two thirds contribution of these deaths (Lancet 2017). The estimated cost for air pollution in Bangladesh is about 1% of its GDP (World Bank Report 2014). Dhaka is a densely populated megacity with about 17 million habitants. Dhaka ranked number one in the World due to the per capita exposure of PM_{2.5} (SOGAR 2017). Many sources are contributing to the worst air quality in Bangladesh, e.g., traffic emissions, brick kilns, industries, construction activities, biomass burning for cooking, and transboundary pollution, etc. In this conference, I will be presenting the trend of the last five years air quality in urban and rural locations in Bangladesh with respect to the fine particulate matters (PM_{2.5}), aerosol optical depth (AOD), carbon monoxide (CO), and chemical composition of PM_{2.5} (e.g., BC, OC, SO₄²⁻, NO₃⁻, trace elements, etc.). PM_{2.5} samples were collected on filters with Digitel PM_{2.5} sampler (Switzerland) and Air photon samplers, USA. AOD was continuously monitored with NASA AERONET Cimel sunphotometer. Carbon monoxide was determined with Horiba Instruments, Japan. BC was measured from filters (with thermal and optical method) and also real time with an Aethalometer AE42 (Magee, USA). Water soluble ions (SO₄²⁻, NO₃⁻, etc.) were determined from filters with ion chromatogram (IC). Trace metals were determined with Atomic Absorption Spectrophotometer (AAS) and Inductively Coupled Plasma- Mass Spectrometry (ICPMS). Positive matrix factorization (PMF) was used for sources apportionment study. NOAA HYPPLIT was used for the air mass trajectory analysis. The annual average concentration of the PM_{2.5} was about 53.0 µgm⁻³ in Dhaka, Bangladesh. The daily average values were above the Guideline value of World Health Organization (WHO) frequently. The seasonal average concentration was the highest in winter season whereas the lowest was in monsoon season at both urban and rural locations. The nighttime CO concentrations were higher than daytime in Dhaka. The AOD values in Dhaka were comparable with other south Asian cities but much higher than European and North American cities. The Island Bhola has the one of the highest background AOD value during winter time. The lead concentration was decreasing in Bangladesh but still higher compare than the other locations of the World.

Key words: Particulate matter, AOD, carbon monoxide, black carbon, lead