Carbonaceous Analysis of Fine Particulate Matter in Proximity to the Historical Monument Itimad-Ud-Daulah, Agra

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Abstract:

$PM_{2.5}$ which is also known as Fine Particulate Matter (having aerodynamic diameter of less than equal to 2.5 µm is a designated criteria pollutant by USEPA, is directly emitted into the atmosphere or results from the transformation of gaseous pollutant. $PM_{2.5}$ is found to be associated with various health hazards such as chronic lung disease and asthama, lung cancer, heart attack, exacerbation of COPD and pre mature death. One of the carbonaceous content of $PM_{2.5}$ elemental carbon is found to be associated with climate change. The present study is aim to investigate concentration and carbonaceous characterization of fine particulate matter. The study was carried out near a historical monument Itimad –Ud –Daulah during the winter period (January 2022), samples of $PM_{2.5}$ was collected at the sampling site via Fine Particulate sampler APM 550 on Quatrz Fiber Filter paper and analyzed for organic carbon and elemental carbon. The average mass concentration of $PM_{2.5}$, OC and EC were 231.60 µg/m^3, 29.74 µg/m^3 and 11.98 µg/m^3 respectively. The % contribution of OC and EC to the mass $PM_{2.5}$ is found to be 12.84 % and 5.17 % respectively which indicate that OC and EC contribute a significant portion in $PM_{2.5}$.

The concentrations of $PM_{2.5}$ also find to be 6 and 46 times higher than the annual average standards provided by NAAQS and WHO. The results of the study indicate that burning of carbon containing fuel for residential heating and unfavorable meteorological condition during the winter period combinedly contributes in the increased concentration of OC, EC and $PM_{2.5.}$ OC and EC were also found to be positively correlated to each other, indicating their emission from common sources.

Keywords:

$PM_{2.5.}$ OC, EC, WHO, NAAQS.