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Heterogeneity in $PM_{2.5}$ Oxidative Potential over two major cities in the East and West regions of Indo-Gangetic plain

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Aerosols emitted from different sources vary in chemical characteristics and play a major role in adverse health effects for humans. $PM_{2.5}$ over the urban environment mainly represents industrial, vehicular and residential emissions. In the present study, we have compared the oxidative potential (OP, capacity of PM to generate reactive oxygen species, ROS) of the $PM_{2.5}$ samples collected from eastern (Kolkata) and western (Ahmedabad) part of India during November 2020 to March 2021. Average $PM_{2.5}$ concentrations during the study period were 194± 40 and 91 ± 37 μg m^{-3} at Kolkata and Ahmedabad, respectively. OP measured through DTT-assay shows that the volume-normalized OP (OP_V) was 11.3 ± 6.8 and 12.5 ± 6.8 nmol DTT $min^{-1}m^{-3}$ at Kolkata and Ahmedabad, respectively. However, the mass-normalized OP (OPm) was 56.4 ± 26.1 and 144.8 ± 76 pmol DTT min^{-1} μg^{-1} at Kolkata and Ahmedabad, respectively. Interestingly, OPm was much higher at Ahmedabad even though the concentration of $PM_{2.5}$ at Kolkata was more than twice that of Ahmedabad. Regression statistics show that OP_V strongly correlates with organic carbon (OC) and water-soluble organic carbon (WSOC) present in PM at both sites; however, their slopes were different. The OC and WSOC contribute an average of 26 and 10 % at Kolkata and 25 and 13% at Ahmedabad to the total PM. It is inferred from the observation that the ROS-generating species are mainly emitted along with the OC and WSOC in PM at both sites, and anthropogenic activities at Ahmedabad emit large amounts of ROS-generating species compared to Kolkata. Results indicate a large heterogeneity in the $PM_{2.5}$ OP over East and West India.