SUMMARY OF THE UGC MAJOR RESAERCH PROJECTE

POLYCYCLIC AROMATIC HYDROCARBONS AND THEIR RELATED CARCINOGENIC POTENCIES ESTIMATION IN THE $PM_{2.5}$ PARTICULATE MATTER IN URBAN AND SUBURBAN AREA OF MUMBAI.

The outdoor study of particulate matter ($PM_{2.5}$) and their associated PAHs were carried out at urban and sub-urban site in the most polluted metropolitan city of India from July 2016 to December 2017. Four locations at each site were selected to collect the particulate matter samples. Further the collected Particulate samples were analyzed for 16 USEPA priority PAHs. The sampling was carried out during summer, winter, rainy and post rainy season for 24 hours at the flow rate of 9 L/m. The samples were analysed using Gas chromatography with mass spectrometry detector (GC/MS). The identified concentration of PAHs was calculated by relating the MS response of the quantitation ion produced by the compound that was used as an internal standard. The identified 15 PAHs are benzo(e)pyrene [B(e)P], benzo(ghi)perylene [B(ghi)P], naphthalene (NAP), acenaphthylene (ACY), acenapthene (ACE), flourene (FLU), phenantharene (PHE), anthracene (ANT), fluoranthene (FLT), pyrene (PRY), benzo(b)fluoranthene [B(b)F], benzo(k)fluoranthene [B(k)F], Benzo-g-perylene [B(g)P], benzo(a)pyrene [B(a)P] and indenol(1,2,3- cd)pyrene. The concentration of $PM_{2.5}$ at urban site ranged between 40.15 µg/m^3 to 108.44 µg/m^3 and at sub-urban site it ranged between 40.51 µg/m^3 to 127.73 µg/m^3. The concentration sum of TPAHs (∑TPAHs) at urban location was observed to be 1206.63 ng/m^3 and at sub-urban location it was observed to be 1064.31 ng/m^3. The ∑TPAHs at urban area is higher than that of the sub-urban area, because of heavy vehicular pollution due to heavy traffic roads. The concentration trends of PAHs in PM2.5 particulate matter at urban site was NAP<PHE<FLU<PRY<ACE<ANT<ACY<FLT<B(b)F<I(123cd)P<B(k)F<B(e)P<B(ghi)P< B(a)P<B(g)P and at sub urban site was

NAP<FLU<PHE<ACE<PRY<ANT<ACY<B(b)F<FLT<(k)F<B(e)P<B(ghi)P<I(123cd)P<B (a)P<B(g)P. the PAHs and $PM_{2.5}$ concentration were found to be higher during winter season followed by post monsoon, summer and rainy season. Results of the PAHs diagnostic ratio and principal component analysis revealed that vehicular traffic of gasoline and diesel powered vehicles were the main dominating sources at the two locations. The concentration of $PM_{2.5}$ particulate matter was found to be very alarming when compared with National Ambient Air Quality standards and World Health Organisation. Thus to assess the human health risk associated with the PAHs exposure, individual PAH relative carcinogenicity was calculated using toxicity equivalent concentration by multiplying the PAH concentration to its corresponding toxic equivalent factor (TEF). At urban site the total B(a)P equivalent exposure (BaPeq) for all the PAHs was ranged from 0.015 ng m^{-3} to 3.994 ng m^{-3} whereas at suburban site it was ranged from 0.01 ng m^{-3} and 3.78 ng m^{-3}. Among all the PAHs, B(a)P had account the most with percentage 54% followed by B(b)F, I(123cd)P, B(k)F, ANT, PHE, B(ghi)P, FLU, PYR, ACE, ACY, B(g)P, FLT, at urban site and at sub-urban site the percentage range of B(a)P among all the PAHs was 53% followed by B(b)F, NAP, B (k)F, I(123cd)P, ANT, FLU, PHE, ACE, B(ghi)P, PYR, ACY, B (g)P FLT. Thus the results of the present study raise the need of the continuous monitoring of organic aerosol constituents in ambient air of the cities, where the chances of exposure to the population are high especially for PAHs which cause cancer and also for the quantitative source apportionment estimation of PM and PAHs.

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