

"Crude electronic waste recycling by the informal sector is a potential source for a Cocktail of toxicants in Indian cities: Atmospheric transport models and health risk assessment"

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Following a trajectory of rapid economic development, an increasing demand for electronic equipment in India inevitably generates large amount of domestic electronic waste (e-waste) in addition to the dumped e-waste from developed nations. Because the rate of e-waste accumulation is startling and the combinatorial effects of toxicants are complex we aimed to investigate hazardous organic compounds (HOCs) in the surface soil and atmosphere of informal e-waste recycling corridor and nearby dump sites of four major Indian cities: New Delhi in the north; Kolkata in the east; Mumbai in the west and Chennai in the south. Incomplete combustion and pyrolytic processes in e-waste recycling workshops might have contributed in the emission of high levels of HOCs viz., polychlorinated dibenzo para dioxins and furans (PCDD/Fs), polychlorinated biphenyls (PCBs), phthalic acid esters (PAEs) and BPA. With positive matrix factorization (PMF) as a source-receptor modelling technique, we could identify metal recovery process as a specific factor for loading of dioxin like PCBs. A significant correlation was obtained between soil bis-2-ethyl hexyl phthalate (DEHP) and PCB- 126 ($R^2 > 0.9$, $p < 0.01$) in shredding and metal recovery sites where burning of plastic cables was prevalent. Furans, PAEs and BPA were higher in the acid leaching sites of New Delhi thereby leading to the highest toxicity equivalents (TEQs) for PCDD/Fs among all the cities. Although HYSPLIT model outputs indicated localized sources but sub-tropical/tropical climate in these cities have profound implications for the atmospheric transport of these semi-volatile HOCs away from the source regions.