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ASSESSMENT OF ORGANOPHOSPHATE FLAME RETARDANTS IN AIR SAMPLES FROM AN ELECTRONIC WASTE DUMPSITE IN LAGOS, NIGERIA

In developing countries, recycling of electrical and electronic waste (e-waste) has attracted much attention as a significant source of persistent organic pollutants (POPs). E-waste contains hazardous materials such as flame retardants (FRs) that require special handling and recycling methods to avoid environmental contamination and detrimental effects on human health. E-waste dumpsites have been found to contain a composite of these wastes, which are released to the surrounding environments –air, water, dust, soil and sediment during improper recycling activities such as the manual dismantling of devices and open burning of e-waste. When e-wastes are improperly dismantled and recycled, toxic pollutants are released into the environment.
Human exposure to e-waste is on the increase in Nigeria. This is because of the indiscriminate disposal and crude informal recycling methods in the country. This study reports for the first time the occurrence of Organophosphate Flame Retardants (OPFRs) in atmospheric samples from an e-waste dumpsite in Lagos, Nigeria. In this study, ten indoor and outdoor air samples were collected between June and July 2022 from five different locations at an e-waste dumpsite in Lagos, Nigeria, to investigate the occurrence of a range of 7 congeners of OPFRs which include tris (2-chloroethyl) phosphate (TCEP), tris (2-chloroisopropyl) phosphate (TCIPP), tris (1,3-dichloro-2-propyl) phosphate (TDCIPP), amongst others. Overall, the highest mean concentration of OPFRs was found in the indoor repair and storage shop (12,770 pg/m3); followed by the indoor dismantling shop (10,505 pg/m3). TCIPP had the highest mean concentration for all samples (15,230 pg/m3), followed by TCEP (15,040 pg/m3) while the least was EHDPP (257 pg/m3). All target compounds were detected at the dumpsite; the concentrations from outdoor samples were comparatively lower than the indoor air samples indicating a health risk to the e-waste workers who spend a large proportion of their time indoors sorting the e-waste and have high exposure to hazardous air pollutants.

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