Abstract

Dioxins and furans are no doubt the most notorious class of organochlorine toxicants in the environmental system whose adverse effects are detrimental to public health with extreme negative economic impacts. Polychlorinated dibenzo-*p*-dioxin and dibenzofurans and dioxin-like compounds such as the polychlorinated biphenyls, carbazoles are in the class of persistent organic pollutants—prioritized under the Stockholm convention as the “dirty dozens”, besides being listed as group 1 human carcinogens by the International Agency for Research on Cancer. Because of their recalcitrant nature in the environment, bioaccumulation in lipids of cells of animals and their general toxicities, this family of compounds has received increased scientific interest in pollution and toxicology research. Accumulation of these toxicants in lipids of animals, and human exposure has been traced to animal products such as meat, eggs, milk and fish. Combustion events, industrial and municipal waste incineration practices, open fires and some industrial activities especially those dealing with metallurgy are well-established sources of these environmental contaminants. The critical aspects of dioxins, furans and their analogues; notably their sources their mechanistic formation by precursor initiation, de novo pathways, how they manifest their toxicity by activation of aryl hydrocarbon receptor, detoxification of these chemicals from the environment and the analytical methods used to quantify and detect from environmental sample matrices has been explored in this work. This review also provides an in-depth examination of the toxic characteristic behaviour of dioxins and furans, polycyclic aromatic hydrocarbons as well as the emerging nitrogenated analogues of dioxins such as polychlorinated carbazole, and carbazole itself.