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Alkylphenols and bisphenol A in the aquatic environment and their leaching from plastic products – a review

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ABSTRACT

Environmental pollution with plastics and plastic debris is one of the major issues in the world. In addition to the problem of microplastics formed from these wastes, additives leached from plastics are also an important aspect. This review paper pays particular attention to three phenolic compounds - bisphenol A (BPA), 4-n-nonylphenol, and 4-tert-octylphenol (4tOP) – used, among others, in the plastics industry. Numerous studies have shown that bisphenol A, 4-nonylphenol, and 4-tert-octylphenol are leached from plastic products, which is also an important source of their release into aquatic environments. The leaching process is influenced by external factors, including temperature, mixing, exposure to ultraviolet light, chemical or mechanical abrasion, and aging and brittleness of plastics. A significant amount of leaching tests are concerned on the migration of BPA from polycarbonate bottles into water. There is less comprehensive information on three phenolic compounds leached from different types of polymers. Moreover, despite the availability of several economic and ecological techniques for their removal from water and wastewater (including coagulation, adsorption, membrane processes, advanced oxidation), significant amounts are noted in some of the aquatic environments, which may cause harmful endocrine effects in organisms living in these ecosystems.

Keywords: Alkylphenols; Nonylphenols; Octylphenols; Bisphenol A; Aquatic environment; Leaching from plastic; Plastic additives; Remediation

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