

Marine microplastics bound dioxin-like chemicals: Model explanation and risk assessment.

Datenbank

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Deskriptoren

Mikroplastik; Styropor; Altern (Werkstoff); Bioassay; chemische Analyse; Kontamination; Schmutzstoff; expandierbares Polystyrol; Styrol; Oligomer; Risikoabschätzung; Bioanalytik; Gesundheitsrisiko; Meeresumwelt; Additiv; Pellets

Abstract

Microplastics have become one of the most pervasive emerging pollutants in the marine environment because of their wide occurrence and high sorption ability for hydrophobic organic contaminants (HOCs). Among the associated HOCs, dioxin-like chemicals (DLCs) can pose severe health risks; however, information on effects of microplastics bound DLCs is lacking. To fill this knowledge gap, this study integrated chemical analysis and in vitro bioassays to elucidate the potential dioxin-like effects of microplastics bound DLCs. Chemical analysis results demonstrated that styrofoams possessed significantly greater DLCs than other coastal or open ocean plastic particles. This was probably due to the presence of additives and greater sorption ability of expanded polystyrene. However, styrofoams did not show as strong dioxin-like effects as predicted by the bioanalysis equivalent model in bioassays. This could be attributed to the decreased DLC bioavailability and increased competition with the presence of styrene oligomers. Besides, bioassay results also demonstrated that aging increased the associated DLC concentrations, since extra sorption from surrounding environment occurred during prolonged retention periods. Finally, it was estimated that the leaching of DLCs could induce dioxin-like effects in marine organisms under 100% (11/11) and 18% (2/11) scenarios for aged pellets and styrofoams through aqueous or dietary exposures. /// Copyright Elsevier B.V. Reproduced with permission.

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Quelle

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