

Editorial

Environmental Behavior and Effects of Pollutants in Water

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Water pollution caused by anthropogenic activities is one of the major environmental problems in the world. Persistent toxic substances can be divided into two categories, mainly persistent organic pollutants and heavy metals. Persistent toxic chemical pollutants have become a problem of global concern. They have high bioaccumulation properties and are extremely difficult to degrade. They can realize long-distance transmission. They contain carcinogenic and mutagenic factors and have strong endocrine interference. International environmental protection organizations, governments, and researchers all over the world have paid close attention to this issue. A large number of hazardous substances such as heavy metals, petrochemicals, pharmaceuticals, nanomaterials, pesticides, and herbicides are released into the aquatic environment intentionally or unintentionally during industrialization and urbanization, endangering wildlife and human health. However, there are significant differences in environmental behavior and toxicity of different types of pollutants. For example, heavy metals in water may exist in different forms, which in turn may be altered by environmental conditions such as the presence of different types of organic matter, the pH and hardness of the water system, and form transformation, thus affecting their behavior and bioavailability. The biological effects and toxicological mechanisms of organic pollutants are more complex. Some organic pollutants are hydrophobic and tend to accumulate in aquatic organisms, while others are hydrophilic and easily migrate in water. Therefore,

studies into the environmental behavior and ecological effects of these pollutants in aquatic environments are required.

This special issue aims to bring innovative articles on the environmental behavior and effects of anthropogenic pollutants in aqueous environments. It mainly includes the transport, fate, toxic effects, and environmental management of pollutants. The articles received by the journal were carefully selected, thus offering a high-quality collection. A total of 19 articles have been accepted, and several representative articles are listed below.

Y. Hong et al. review paper titled “Progress in the Research of the Toxicity Effect Mechanisms of Heavy Metals on Freshwater Organisms and Their Water Quality Criteria in China” introduced the sources, hazard levels, toxic effect mechanisms, and the current research status of water quality criteria for heavy metal pollutants in China. In addition, the focus and direction of future research on the toxic effects of heavy metals on aquatic organisms and the necessary changes in criteria were also discussed. This review paper would provide an important theoretical basis for the future research of water quality criteria and risk assessment of heavy metal pollutants.

Z. Yan et al. presented a paper on the influence of temperature and pH on the risk of ammonia nitrogen (AN). They collected the ecotoxicity and exposure data of AN in Chinese surface freshwaters in 2017. The species sensitivity distribution of AN was established, and the ecological risk of

AN in Chinese surface waters was assessed. Ecological risk assessments on AN suggested that, in summer and autumn, when the water temperature and pH are high, the risk of AN may occur at some sites with good water quality. The authors pointed out that neglecting water parameters' impact may lead to underestimation of ecological risk of AN in Chinese basins.

J. Zhang et al. presented a paper on aerobic biodegradation of four groups of steroid hormones in activated sludge. They first developed an analytical method for simultaneously monitoring four groups of 29 steroid hormones in a single water sample. Laboratory studies were then performed to investigate their aerobic biodegradation which was found to follow first-order reaction kinetics. Among all of the target hormones, halogenated glucocorticoids were more persistent than others. In addition, C-21 ester glucocorticoids were more prone to decomposition than C-17 esters. Hydrolysis did not significantly affect the decomposition of esterified steroids.

B. Lei et al. presented a paper titled "The Interaction Test of Binary Mixtures of Endocrine-Disrupting Chemicals Using *In Vitro* Bioassays." In this study, they evaluated the combined effects of estradiol valerate (EV) and other four endocrine-disrupting chemicals on the human breast MCF-7 cells by detecting the cell proliferation, intracellular reactive oxygen species (ROS) levels, and estrogen receptor alpha (ER α) protein expression using the equal concentration ratio method. The authors found that EV had the strongest effect in inducing cell proliferation. They concluded that the joint toxicity of binary mixtures of EV and other EDCs do not interact in a synergistic fashion in inducing cell proliferation, intracellular ROS levels, and ER α protein expression.

Kong et al. presented a paper on human health risk assessment of thyroid-disrupting activities of groundwater from a riverbank filtration (RBF) system in Wuchang City, China. They used TRgene yeast assay to reveal the presence of thyroid-disrupting activities in the groundwater from the RBF system. And then, they applied a novel risk assessment approach to assess the impact of thyroid hormones on humans. Their study shows that RBF systems can remove the TDCs from river water and samples collected during the dry season had higher TR antagonistic activity. These findings are highly relevant to environmental safety and human health and will provide an important scientific basis for drinking water safety.

Dai and Zeng investigated the distribution and bioaccumulation of perfluoroalkyl acids (PFAs) in the Xiamen coastal area where there were no rivers from other cities. In their study, six types of PFAs were analyzed in water, sediments, and organisms from both freshwater and seawater. The results showed that the PFA concentration in water was positively correlated with the PFA concentration in sediments. The bioaccumulation factors were also calculated with the quantity of PFAs in different trophic levels of aquatic organisms. The findings of this study can be used to support the environmental management of organic pollutants in the coastal area.

Considering the current special issue, we think the selected articles offer an ideal opportunity to update our knowledge on environmental behavior and effects of different pollutants in water environment.

Conflicts of Interest

The guest editors have no conflicts of interest to declare.

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