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Editorial: Advanced oxidation processes for contaminants of emerging concern

Water contamination is a global problem that affects millions of people worldwide. Contaminants of emerging concern (CECs) are a particular challenge, as they are not yet regulated and can pose significant risks to human health and the environment. Conventional water treatment approaches are not very effective at removing contaminants of emerging concern; however, these can sometimes be chemically, energetically, and operationally intensive. In this context, advanced oxidation processes (AOPs) have emerged as sustainable technologies for stopping pollutants from reaching the environment, offering different solutions to many environmental problems. In this special issue of Water Science and Technology, we present recent developments in AOP technology for treating CECs.

The use of AOPs to treat water contaminants has gained significant attention in recent years. AOPs involve the generation of highly reactive species, such as hydroxyl and sulfate radicals, which are capable of degrading organic compounds into simpler and less toxic products. In this special issue, we present a collection of articles highlighting recent developments in AOP technology for treating CECs. This special issue also includes articles on the use of AOPs for the treatment of antibiotics, pharmaceuticals and personal care products, and other organic pollutants. The articles cover a range of AOP technologies, including photocatalysis, electrochemical oxidation, catalyst, persulfate oxidation, and air plasma.

The articles in this special issue highlight the potential of AOPs for treating CECs. However, it is essential to note that the effective treatment of CECs requires a holistic approach considering the entire water treatment process. AOPs are just one component of a comprehensive water treatment strategy, and their effectiveness depends on a range of factors, including the characteristics of the contaminants, the water matrix, and the treatment conditions.

One of the key themes that emerge from the articles in this special issue is the use of novel nanomaterials and processes for the treatment of CECs. Due to their high surface area and unique electronic properties, nanomaterials, such as Cu-N/TiO_2 and zinc oxide, are effective catalysts for AOPs.

The articles in this special issue also highlight the importance of considering real water matrices, including palm oil mill effluent waste activated sludge, wastewater treatment plants, and pharmaceutical wastewater, in developing and optimizing AOPs for the treatment of CECs. The characteristics of the water matrix can significantly affect the effectiveness of AOPs, and it is crucial to consider these factors when designing and optimizing AOP treatment systems.

In conclusion, the articles in this special issue of Water Science and Technology highlight recent developments in AOP technology for treating CECs. The studies demonstrate the potential of AOPs for removing a wide range of organic pollutants from water and emphasize the importance of process optimization and integration of other processes for the effective treatment of CECs. While AOPs are a promising technology for treating CECs, it is important to recognize that effectively treating these contaminants requires a holistic approach considering the entire water treatment process.

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