



Review

Emerging Trends in the Remediation of Persistent Organic Pollutants Using Nanomaterials and Related Processes: A Review

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Abstract: Persistent organic pollutants (POPs) have become a major global concern due to their large amount of utilization every year and their calcitrant nature. Due to their continuous utilization and calcitrant nature, it has led to several environmental hazards. The conventional approaches are expensive, less efficient, laborious, time-consuming, and expensive. Therefore, here in this review the authors suggest the shortcomings of conventional techniques by using nanoparticles and nanotechnology. Nanotechnology has shown immense potential for the remediation of such POPs within a short period of time with high efficiency. The present review highlights the use of nanoremediation technologies for the removal of POPs with a special focus on nanocatalysis, nanofiltration, and nanoadsorption processes. Nanoparticles such as clays, zinc oxide, iron oxide, aluminum oxide, and their composites have been used widely for the efficient remediation of POPs. Moreover, filtrations such as nanofiltration and ultrafiltration have also shown interest in the remediation of POPs from wastewater. From several pieces of literature, it has been found that nano-based techniques have shown complete removal of POPs from wastewater in comparison to conventional methods, but the cost is one of the major issues when it comes to nano- and ultrafiltration. Future research in nano-based techniques for POP remediation will solve the cost issue and will make it one of the most widely accepted and available techniques. Nano-based processes provide a sustainable solution to the problem of POPs.

Keywords: persistent organic pollutants; nanomaterials; degradation; remediation

1. Introduction

Over the past few decades, water pollution containing organic pollutants has seen a tremendous increase due to the high consumption of such pollutants. Persistent organic