A mini review on membrane potential for pharmaceutical and personal care product (PPCP) removal from water

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ABSTRACT

Recently, environmental awareness has grown due to the emergence of pharmaceutical and personal care products (PPCPs) as pollutants that ended up in water bodies and become a threat to the aquatic ecosystem and clean water sources. To solve this worldwide clean water dilemma, new environmentally friendly technology is required. Membrane technology for PPCP removal provides several advantages over other methods such as conventional wastewater treatment plant, advanced tertiary treatments (ATTs), adsorption activated carbon (AAC), and advanced oxidation process (AOP). Many studies have proven the effectiveness of membrane technology for PPCP removal from water resource, yet, the major challenge is still there: membrane fouling. In order to overcome this challenge, functionalization of membrane has been introduced. The modification or functionalization of membranes through the addition of nanomaterial, MOFs, and microorganisms successfully assists in better hydrophilicity, high water flux, excellent permeability, and fouling resistance of the membrane. This study provides a thorough analysis of membrane materials, methods for fabricating membranes, and a clear grasp of the benefits and drawbacks of each. It also describes how microbes, metal–organic frameworks, and nanomaterials could functionalize the polymeric and inorganic membranes. Finally, the removal of PPCPs using polymeric and inorganic membranes is explored. For record, up to 99% of bisphenol A (BPA) was removed using interfacial polymerization of PSF polymeric membrane. Also, 99.74% of diclofenac was removed using phase inversion method of PES polymeric membrane. This proves that membrane technology is a promising path for water treatment and purification. The Sustainable Development Goals (SDGs), Goals 3 and 14, which are excellent health and well-being and life below the ocean respectively, are in line with this topic.

KEYWORDS

Mixed matrix membranes; Pharmaceutical and personal care products; Electrospinning; Membrane fouling; Polymeric membranes

ACKNOWLEDGEMENTS

We appreciate the financial assistance provided to Miss Ellora Priscille Ndia Ntone by the Ministry of Higher Education of Malaysia under the Malaysia International Scholarship (MIS2022) for Post Graduate Studies.