Phase Inversion Method

ABSTRACT Pollution, adulteration, and the blending of pure with harmful substances have severely degraded our environment, while public unawareness worsens the crisis. Scientists are exploring strategies to address this issue, one being the use of pollutants themselves for remediation. Polyethylene terephthalate (PET), a major contributor to plastic pollution, can be repurposed into membranes for environmental purification through the Phase Inversion method, a low-cost and accessible approach requiring no sophisticated equipment. In this study, the Non-solvent Induced Phase Separation (NIPS) technique was used, where PET was dissolved in liquefied phenol with PEG 400, cast onto glass, and immersed in a water–ethanol bath to induce membrane formation, followed by rinsing and storage in deionized water. Membrane modification is necessary to target diverse pollutants, including organic molecules, metals, pharmaceuticals, refractory compounds, and emerging contaminants. Compared with alternative methods, this approach is affordable, adaptable, and suitable for beginners, though it carries challenges such as the hazardous nature of phenol, membrane fragility, time demands, and the need for proper materials. Validation by FTIR spectroscopy confirmed successful synthesis with characteristic aromatic and carboxyl peaks. Thus, transforming PET from a pollutant into a remediation tool via phase inversion demonstrates an innovative, sustainable, and practical strategy for water purification and pollution control.

KEYWORDS: Recycled PET; Membrane; Phase Inversion; Filtration; NIPS.