PREPARATION, CHARACTERIZATION AND PHOTODEGRADATION OF METHYLENE BLUE BY BIODEGRADABLE NANOCOMPOSITE-MEMBRANES BY PHASE INVERSION METHOD

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Polylactic acid (PLA) and poly caprolactone (PCL) as biodegradable polymers are being highly exploited in the development of innovative materials across several industrial sectors. The pure PLA, PCL, and blends membranes are prepared by Phase Inversion method, likewise, their composite membrane with TiO_2 nanoparticles (NPs) were prepared using the same processing method. The characterization of the different membrane obtained was carried out using FTIR, TGA, SEM and photodegradation of the methylene blue was determined by a photo-reactor (LELESIL INNOVATIVE SYSTEM) and with an illuminating light of 250W. For the FTIR results, the peaks showing the presence of $-CH_3$, -C=O and -C-O bonds which indicate the existence of PLA, for the pure, blend and composites was observed. Similarly, the peaks showing the presence of $-CH_2$, -C=O and -C-O were identified indicating the presence of PCL, for the pure, blend and composite. TGA analysis showed PCL is more thermally stable than the pure PLA and the blend, while the blend fall between the two polymers. Likewise, the composite membrane, the PCL/TiO_2 is more thermally stable than the other two composites. The SEM analysis of the morphology of the membrane showed that the membrane is porous in nature and confirmed the presence of the TiO_2 nanoparticles on the PLA and PCL membrane and their blend. Finally, the degradation % of the blended nanocomposite membrane (PLA/PCL) was 54% at 80 mins and that of pure PLA was 44%.

Keywords: biodegradable polymers, characterization, phase inversion method and photodegradation.

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