

Study Of Shear Rates in Spinning Process of Kaolin/polyethersulfone (PESFf)

Membrane Precursor: Effect on Fiber Morphology

ABSTRACT

The influence of shear stress induced by spinneret geometry on morphology of Kaolin/PESf hollow fiber membranes has been studied. Different extrusion rates at two different rheology properties were introduced on a straight spinneret resulting in various shear rates. The hollow fiber membrane were spun using the wet spinning method to decouple the effect of shear and elongation stress due to gravity stretched drawing and bore fluid rate factors. The morphology of the spun hollow fiber was observed under Scanning Electron Microscope (SEM). Shear rates at the tip of the spinneret annulus were calculated and visualize using a computational fluid dynamics model. Simulation data shows that extrusion rate increment increases the shear rate at the spinneret wall while fluid velocity maximize at the centre of annulus. The maximum shear rate recorded was 431 s^{-1} at an extrusion pressure of 0.5 bar. It is observed that higher shear rates increases the density of the finger like voids and ultimately affect the hollow fiber performance in general.