

Adsorption of Peppermint Essential Oil by Polypropylene Nanofiber

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Abstract : Pure essential oil is highly demanded in the market since most of the so-called pure essential oils in the market contains alcohol. This is because of the usage of alcohol in separating oil and water mixture. Removal of pure essential oil from water without using any chemical solvent has become a challenging issue. Adsorbents generally have the properties of separating hydrophobic oil from hydrophilic mixture. Polypropylene nanofiber is a thermoplastic polymer which is produced from propylene. It was used as an adsorbent in this study. Based on the research, it was found that the polypropylene nanofiber was able to adsorb peppermint oil from the aqueous solution over a wide range of concentration. Based on scanning electron microscope (SEM), nanofiber has very small nano diameter fiber size in average before the adsorption and larger scaled average diameter of fibers after adsorption which indicates that smaller diameter of nanofiber enhances the adsorption process. The adsorption capacity of peppermint oil increases as the initial concentration of peppermint oil and amount of polypropylene nanofiber used increases. The maximum adsorption capacity of polypropylene nanofiber was found to be 689.5 mg/g at (T= 30°C). Moreover, the adsorption capacity of peppermint oil decreases as the temperature of solution increases. The equilibrium data of polypropylene nanofiber is best represented by Freundlich isotherm with the maximum adsorption capacity of 689.5 mg/g. The adsorption kinetics of polypropylene nanofiber was best represented by pseudo-second order model.

Keywords : nanofiber, adsorption, peppermint essential oil, isotherms, adsorption kinetics

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