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Study of synthetics dyes adsorption onto poly (vinyl alcohol)/glutaraldehyde/ β -cyclodextrin polymer membranes

Among the numerous techniques of dye removal, adsorption on modified polymers is a procedure of choice; due to easy handling and removal efficiency [1]. Polyvinyl alcohol (PVA) is a water-soluble synthetic biopolymer, biodegradable, and non-toxic. However, to improve the functionality of PVA, this polymer is often combined with nanoparticles and other synthetic and natural polymers, such as polyacrylic acid, chitosan, cyclodextrins [2]. In this work, Crosslinked poly(vinyl alcohol)/glutaraldehyde (PVA/GA) membranes were prepared, and attempts to obtain hydrophilic crosslinked PVA membranes were made by adding various amounts of β -cyclodextrin (PVA/GA/ β -CD). The membranes were characterized by infrared spectroscopy and swelling measurements. The ability of cyclodextrin to include a wide variety of chemicals was also exploited for the dye adsorption to show the potentialities of the membranes in the textile liquid waste processing. Adsorption of reactive, methyl orange and methylene blue dyes on (PVA/GA/ β -CD) membranes was consequently studied using UV-Vis spectroscopy at wavelengths of 547, 463 and 660 nm respectively. Results indicated that there is no covalent bond formation between PVA and β -CD; the β -cyclodextrin is completely mixed into the PVA matrix polymer. The adsorption capacity increase with increasing amount of cyclodextrin; the maximum adsorption capacity was obtained with 8% β -CD. Therefore, change in adsorption capacities may be due to dye structure effect, the negative value of free energy indicated the spontaneous nature of adsorption.

1. M. Constantin, G. Fundueanu et al., *Int. J. Pharmaceut.* 285 (2004), 87-96.
2. J. Won, J.Y. Yoo, M.-S. Kang, Y.S. Kang, *Macromol. Res.* 14 (2006), 449-455.

Preferred topic

Polymers and environment

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