Selective Removal of Methylene Blue dye from Industrial waste effluents by using Supported Liquid Membrane Technology

Muhammad Waqar Ashraf
Department of Mathematics & Natural Sciences, Prince Mohammad Bin Fahd University, P.O Box 1664, Al Khobar 31952, Kingdom of Saudi Arabia (mashraf@pmu.edu.sa)

ABSTRACT

Membranes and membrane-based processes have attained technical and commercial importance with respect to their industrial and environmental applications. In the present work, Supported liquid membrane (SLM) technology has been applied to investigate the removal and recovery of a cationic dye (Methylene Blue) from aqueous solutions. Methylene blue is a cationic dye heavily used by printing industry. It is also used as a stabilizer and indicator in chemical industry. The molecules present in the textile effluent belong to very diverse chemical classes. Hence, textile wastewater presents a challenge to conventional physico-chemical and biological treatment methods. Natural and non-toxic vegetable oils have been used as membrane carriers. A microporous flat sheet film made from polyvinylidene fluoride (PVDF), impregnated with vegetable oils has been used for selective transport of the dye. Fundamental parameters influencing the transport, like pH of feed, acid concentration in the strip solution, initial dye concentration oil types and stirring speeds have been studied. Highest value of flux ($1.7 \times 10^{-5}$ mg-cm$^{-2}$ sec$^{-1}$) for the dye was obtained with sunflower oil as membrane liquid with pH 12 in the feed solution and 0.3M hydrochloric acid in the strip solution. It took 6 hours to transport maximum amount of dye under optimum conditions. Vegetable oils have been proved to be effective in the recovery of the dye from aqueous solution. The dye transport is influenced by number of variables like pH of source phase, hydrochloric acid concentration in the receiving phase, suitable membrane liquids and dye concentration etc.