

# Removal of Fe from potable water using microporous polypropylene membranes grafted with acrylic acid

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The Bureau of Indian Standards has recommended  $0.3\text{mg L}^{-1}$  as the desirable limit and  $1\text{mg L}^{-1}$  as the maximum permissible limit for iron in drinking water. High concentrations of iron generally cause inky flavor, bitter and a stringent taste to water. It can also discolour clothes, plumbing fixtures and cause scaling which encrusts pipes. During this work, polypropylene (PP) micro-porous films (porosity 38%, pore dimensions  $0.02\text{--}0.20$  microns, thickness  $2.5\ \mu\text{m}$  in sheet form) films grafted with acrylic acid (AA) was used for selective removal of Iron from

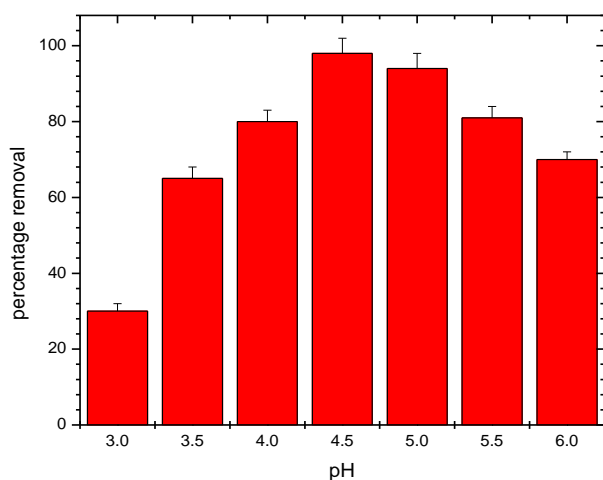


Fig.1: Variation in percentage removal of iron with pH

was done by using ICP-OES. From Fig.1 it is clear that at pH 4.5, 98% Fe was sorbed from the solution. Fig.2 shows the ATR-FTIR spectrum for the PP and PP grafted with AA. From the figure it is clear that prominent vibration band at  $1750\ \text{cm}^{-1}$  (stretch of C=O) is the only major variation between the PP and PP grafted AA, suggesting possible complexation of  $\text{Fe}^{3+}$  with the carbonyl group of AA on the grafted membrane. Preliminary investigation shows a sorption capacity of  $200\ \text{mg g}^{-1}$  of the AA grafted PP membrane. The membranes were regenerated by using  $0.2\text{N HNO}_3$  solution and no degradation was observed up to 20 cycles.

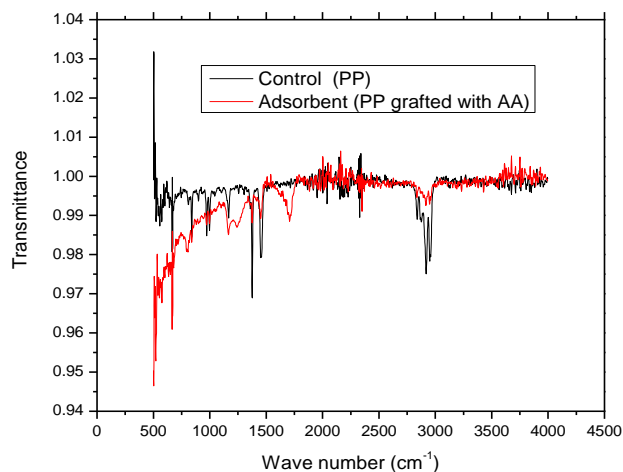


Fig.2: ATR-FTIR spectrum of PP and PP grafted with AA.

groundwater. Mutual radiation grafting technique was used for the preparation of the AA grafted PP film. Details of the same were discussed elsewhere[1]. Laboratory simulated spiked solution of  $\text{Fe}^{3+}$  was prepared by using ICP grade standard solution having the strength of  $1\ \text{g L}^{-1}$ . Spiked solution was allowed to pass through these membrane using suction filtration assembly. These experiments were conducted in the pH 3-6 and in the concentration ranging from  $2\text{--}10\ \mu\text{g mL}^{-1}$ . The determination of Fe

Reference: N. K. Goel, Y. K. Bhardwaj, R. Manoharan, V. Kumar, K. A. Dubey, C. V. Chaudhari, S. Sabharwal: *eXPRESS Polymer Letters*, Vol.3, No.5 (2009) 268–278