



# Adsorptive separation of dye by filled polymeric FIPN hydrogel

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## ABSTRACT

Acrylic acid (AA) and Acrylamide (AM) are copolymerised to produce copolymer of Poly-acrylic acid-co-acrylamide (PAA) in the aqueous solution of Polyvinyl alcohol (PVA). Both the polymers PVA and PAA were cross-linked *in situ* by glutaraldehyde and N, N O-methylene bis acrylamide (MBA) respectively using 2 mass% of polymer basis for both of them. Thus, three different full interpenetrating network (FIPN) hydrogels were synthesised varying the mass ratio of PVA to PAA. The hydrogel of PVA: PAA = 1:0.50 composition designated as PAA50 found competitive for separating Malachite green from its 50 ppm aqueous solution by adsorption compared to the other two. PAA50 was further modified by incorporating 2, 5, 8 and 10 mass% nano size sodium monomontellite filler and produced four filled FIPN hydrogels designated as PAA52, PAA55, PAA58 and PAA510, respectively. These four nano-filled FIPN hydrogels along with unfilled PAA50 and pure nano size sodium monomontellite were used for adsorption in same dye solution of 5, 10, 25, 50, 75 and 100 ppm concentrations and different pH of 4, 7, 9, 10 & 11. Highest 98.039% dye removal was done by PAA58 from 75 ppm feed at 9 pH. 93.7% recovery was observed at 3 pH in desorption study.

## KEYWORDS

Hydrogel; FIPN; adsorption; dye removal; sodium monomontellite

