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Flocculation and adsorption properties of biodegradablegum-ghatti-grafted poly(acrylamide-co-methacrylic acid) hydrogels

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Abstract

This study reports the microwave-assisted synthesis of gum-ghatti (Gg)-grafted poly(acrylamide-co-methacrylic acid) (AAm-co-MAA) hydrogels for the development of biodegradable flocculants and adsorbents. The synthesized hydrogels were characterized using TGA, FTIR and SEM. TGA studies revealed that the synthesized hydrogels were thermally more stable than pristine Gg and exhibited maximum swelling capacity of 1959% at 60 °C in neutral pH. The optimal Gg-cl-P(AAm-co-MAA) hydrogel was successfully employed for the removal of saline water from various petroleum fraction–saline emulsions. The maximum flocculation efficiency was achieved in an acidic clay suspension with a 15 mg polymer dose at 40 °C. Moreover, the synthesized hydrogel adsorbed 94% and 75% of Pb2+ and Cu2+, respectively, from aqueous solutions. Finally, the Gg-cl-P(AAm-co-MAA) hydrogel could be degraded completely within 50 days. In summary, the Gg-cl-P(AAm-co-MAA) hydrogel was demonstrated to have potential for use as flocculants and heavy metal absorbents for industrial waste water treatment.