

Activated carbon–alginate–polyethyleneimine composite bead as a scavenger for ionic pharmaceuticals from neutral solutions

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To make stable, separable, and multifunctional adsorbents, the composite bead (ACAP) composed of aldehyde functionalized activated carbon (AC) derived from orange peel (OP), alginate (A), and polyethyleneimine (P) was designed to scavenge ionic as well as aromatic pharmaceuticals from neutral water. AC was synthesized by the pyrolysis of OP at 600 °C for one hour in the presence of nitrogen gas. The AC was functionalized with the glutaraldehyde in the presence of proton ionized from it during magnetic stirring for three hours. Similarly, hydroxyl of A and amines of P bonded with aldehyde of the product during the process. The resultant multifunctional dendritic framework was blended with calcium ion for making a stable ACAP composite bead. The covalent linkages were verified with FTIR and XPS. The bead was proved as a scavenger by removing model pollutants like 1-naphthol (NPT), diclofenac (DCF), and amitriptyline (AMT) as neutral, anionic, and cationic pharmaceuticals respectively. The composite bead could be a versatile scavenger to adsorb ionic and aromatic pharmaceuticals simultaneously from neutral water.