

Physicochemical behaviour of biopolymer Polyvinyl Pyrrolidone (PVP) and Carboxymethyl Cellulose (Na salt) (NaCMC) Blends and AgCl nanoparticle formation in blended media

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Abstract

Among the various polymer blends studied, the combination of polyvinylpyrrolidone (PVP) and sodium carboxymethyl cellulose (NaCMC) presents an attractive platform for developing biocompatible, hydrophilic, and mechanically tunable materials. The PVP/NaCMC matrix is particularly suited for in situ nanoparticle synthesis and stabilization, as the functional groups present in both polymers can act as coordinating agents, reducing agents, or steric stabilizers, depending on the system. Embedding AgCl NPs within this matrix not only stabilizes the nanoparticles but also enhances the mechanical and functional properties of the resulting film. Such polymer blends were characterized by examining different physicochemical properties including interfacial tension, conductance, turbidity, dynamic light scattering and shear viscosity using different techniques like tensiometry, conductometry, turbidimetry, viscometry etc. AgCl nanoparticles (NPs) were synthesized via a simple precipitation method and uniformly incorporated into the PVP-NaCMC blend. The structural and morphological properties of the nanocomposite were analyzed using the FESEM technique. Several blend compositions were used to prepare AgCl dispersions by controlled reaction between AgNO_3 and KCl.

Keywords: Silver Chloride nanoparticle, PVP, NACMC, nanocomposite. morphology.