

A Novel Alginate/Tea Waste Complex for Restoration and Conservation of Historical Textiles Using Immobilized Enzymes

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Abstract : Through numerous chemical linkages, historical textiles in burial contexts or in museums are exposed to many different forms of stains and filth. The cleaning procedure must be carried out carefully without causing any irreparable harm, and sediments must be removed without damaging the surface's original material. Science and technology continue to develop novel methods for cleaning historical textiles and artistic surfaces biologically (using enzymes). Lipase and α -amylase were immobilized on nanoparticles of alginate/tea waste nanoparticle complex and used in historical textile cleaning. The preparation of nanoparticles, activation, and enzyme immobilization were characterized. Optimization of loading times and units of the two enzymes was done. It was found that the optimum time and units of amylase were 3 hours and 30 U, respectively. While the optimum time and units of lipase were 2.5 hours and 20 U, respectively, FT-IR and TGA instruments were used in proving the preparation of nanoparticles and the immobilization process. SEM was used to examine the fibres before and after treatment. In conclusion, a new carrier was prepared from alginate/Tea waste and optimized to be used in the restoration and conservation of historical textiles using immobilized lipase and α -amylase.

Keywords : alginate/tea waste, nanoparticles, immobilized enzymes, historical textiles

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