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Development of antibacterial fibers and study on effect of guar-gum addition on properties of carboxymethylcellulose/alginate fibers

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The effect of carboxymethylcellulose (CMC) addition on the tensile and absorption properties of alginate fibers had been reported in the previous research. Great increase in absorbency was observed due to addition of CMC to calcium alginate fibers but were not balanced with mechanical strength. Because, by addition of CMC dry and wet strength of composite fibers was reduced, therefore, a balance was needed between the absorbency of the fibers and mechanical strength. In this paper the effect of introducing a third component Guar gum on overall mechanical and absorbency characteristics is reported. In comparison to calcium CMC/alginate co-spun fibers, it was shown that inclusion of Guar gum improves the tensile strength as well as absorbency. Guargum/CMC/alginate fibers were extruded through two different coagulation conformations. In first step the dope solution was extruded through CaCl_2 coagulation bath. The dope of optimized composite fiber formulation with adjusted mechanical property and absorption was extruded then through 50:50 CaCl_2 and ZnCl_2 coagulation bath. The formed guar-gum/CMC/ Zn /calcium alginate composite fibers were found excellent for medical applications with super absorbency along with equivalent mechanical strength and high antibacterial efficacy.

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