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Polyamide fibers coated with chlorhexidine

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Results of dynamic and equilibrium of sorption of a reactive dye Remazol Brilliant Blue, and a bactericidal agent, Digluconate of Chlorhexidine over Polyamide fibers are presented with the aim of supplying the fiber with bactericidal properties. However, adsorption of Chlorhexidine onto Polyamide is scarce due to the lack of interactions between the reactive groups of the fiber and the antiseptic molecule. Therefore, in order to provide the fiber surface with anionic groups, fiber has been previously dyed with Remazol Brilliant Blue which increases the negative charge of the fiber surface due to the presence of its sulfonate end groups. Thermodynamic parameters of equilibrium sorption in the two situations, fiber/dye and fiber-dye/Chlorhexidine, has been analyzed, as function of the temperature, pH and concentration of the dye in the pretreatment. Results show that when sorption of RBBR reaches the value of about 50 mmol/kg at higher temperature and concentration tested the amount of CHX adsorbed onto fiber/RBBR system is 6 mmol/kg. Both processes, adsorption of RBBR and adsorption of CHX, fit well to Langmuir adsorption model, suggesting the existence of some kinds of specific interactions between adsorbent-adsorbate. Thermodynamic functions show that the interaction is endothermic and spontaneous in all the range of temperature tested. The kinetic studies show that sorption of RBBR are better described by pseudo-first order model even the fit of second order exhibits high correlation coefficient, because of the coincidence between theoretical and experimental values of amount of dye adsorbed at equilibrium. Sorption of CHX fits better to pseudo second order model, being this last one quicker than RBBR process, and diffusion coefficient is also higher in this last situation. According to the obtained results chemical interaction between vinyl-sulphone group of RBBR and the amine groups of Polyamide fiber, followed by electrostatic interactions between the guanidine group of the Chlorhexidine and the sulfonate groups of the dye could explain the adsorption process.

Biography

M A López is studying dentistry in Granada in his final year of degree. He also worked few days per week in a dental clinic like as an Assistant. He also visits laboratory in the Physics Department to investigate new properties of the Chlorhexidine, since he is interested in a PhD research work in collaboration with this department.

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