Kharazmi University
Faculty of Science - Biological Science Department
Biochemistry Devision

Thesis Title:

The study on the interaction of protein nanofibrils, prepared from hen egg white lysozyme, with Azo dyes

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September 2012

Abstract

The colored wastewater is one of the main environmental pollutants. The 70 percent of the commercial colores are azo dyes. Most of these colores are toxic and even carcinogen and promptly needing to eliminate from wastewater. The general refinement processes are not suitable to decolorizate entirely wastewater and also take time and high cost. Adsorbing and coagulation are more efficient methods for removing colores from aqueous solutions because these methods are simple, high efficient and also economical. Nowadays, many studies are carried out on the usage of new adsorbants from natural or synthetic polymers. It is possible to use assembled proteins and protein nanofibrils as biopolymers and as the natural coagulative agents to eliminate colores from wastewater. In present study, after purification of lysozyme from hen egg white and induction its fibrillation, its nanofibril was examined as a bioadsorbant of eight different azo dyes including Acid Red 114, Acid Red 88, Chrysolidin, Bismarck Brown R, Direct Violet 51, Reactive Black 5, Reactive Orange 16 and Congo Red. By using the standard methods it was determined that the extracted protein was high pure and its amyloid fibrils were made of beta sheet structure and had about 40 nanometer dimension. The effects of nanofibril concentration and different parameters of colored solution such as pH, temperature and ionic strength on the quality of adsorption was explored. Removing the dyes from solution was dependent on nanofibrils concentration, although decolorization was stable in different temperatures. The pH showed special effect on the removing of the dyes and in the neutral pH its efficiency was maximum. In addition, increasing ionic strength caused to decrease decolorization property of the fibril. According to the results in this study, lysozyme nanofibrils are able to decolorize aqueous solutions from the consider dyes and can be as efficient bioadsorbants to remove azo dyes from wastewater by the coagulation phenomenon.

Key words: Lysozyme, Nanofibril, Azo dye, Decolorization, Coagulation.