



18th National and 3rd International Conference of هجدهمین همایش ملی و سومین همایش اranian Biophysical chemistry مین المللی بیوشیمی فیزیک ایران

25-26 Des, 2024, University of Hormozgan

۶-۵ دی ماه ۱۴۰۳، دانشگاه هرمزگان

Fibrillar proteins and their role in the removal of heavy metal contamination from water sources: A study of the β-Lactoglobulin-Lactic acid complex

Amir Hekmat and Azadeh Hekmat*

Senior Inspection Expert of Siraf Energy Petrochemical Company, Tehran, Iran
Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran

Abstract

Currently, water pollution caused by heavy metals is an important global phenomenon. Lead and cadmium are among the most important heavy elements that enter water sources through various ways such as industrial and agricultural effluents unsanitary burial places and urban and industrial water materials and cause serious harm to human health. Recently the use of economic absorbents has received much attention. This research aims to evaluate the beta-lactoglobulin (BLG)-lactic acid hybrid protein as a membrane filter in removing heavy metals such as lead and cadmium. Beta-lactoglobulin Protein fibers were prepared by incubation of the protein in pH 2 and lactic acid. Then the BLG-lactic-acid hybrid was studied by ultraviolet-visible spectroscopy, Fourier transform infrared (FTIR) spectroscopy, and scanning electron microscopy (SEM). After performing dialysis, the absorption capacity of the hybrid was evaluated by atomic absorption spectroscopy (AAS) using standard solution samples of lead and cadmium heavy metals. The structure of the fibers was observed by SEM. UV-visible absorption and FTIR spectra showed the formation of a fiber-lactic acid hybrid. The results of mass spectrometry showed that the percentage of hybrid efficiency for lead and cadmium metal were 31% and 25%, respectively. According to the results obtained from this research, the beta-lactoglobulinlactic acid hybrid is a suitable substrate for the absorption of lead and cadmium heavy metals in polluted waters.

Keywords: Beta-Lactoglobulin, Water refinery, Lead, Cadmium, Lactic acid, Membrane filter

References





18th National and 3rd International Conference of هجدهمین همایش ملی و سومین همایش Iranian Biophysical chemistry بین المللی بیوشیمی فیزیک ایران

25-26 Des, 2024, University of Hormozgan

[1] Zhang Q, Zhang S, Zhao Z, Liu M, Yin X, Zhou Y, Wu Y, Peng Q. Highly effective lead (II) removal by sustainable alkaline active β -lactoglobulin nanofibrils from whey protein. Journal of cleaner production; 255,2020.

[2] Weber W. Distributed optimal technology networks: A concept and strategy for potable water sustainability. Water science and technology: a journal of the international association on water pollution research; 46.241-6, 2002.

[3] Peydayesh M, Pauchard M, Bolisetty S, Stellacci F and Mezzenga R. Ubiquitous aluminium contamination in water and amyloid hybrid membranes as a sustainable possible solution. Chemical Communications; 55(74), 1114311146, 2019.

6-6 دی ماه ۱۴۰۳، دانشگاه هرمزگان