УДАЛЕНИЕ Cu (II) ИЗ ВОДНЫХ РАСТВОРОВ В ЗАКРЫТОЙ СИСТЕМЕ ОБОРОТНОГО ВОДОСНАБЖЕНИЯ С ИСПОЛЬЗОВАНИЕМ ХЛОПЧАТОБУМАЖНЫХ ТКАНЕЙ С АКТИВИРОВАННЫМ УГЛЕМ НАНОМЕТРОВОГО РАЗМЕРА

REMOVAL OF Cu (II) FROM AQUEOUS SOLUTIONS IN A CLOSED RECIRCULATING WATER SYSTEM USING COTTON FABRICS WITH NANO-SIZED ACTIVATED CARBON

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Waste water occurring as a result of industrial activities is very dangerous to living organisms because of having highly toxic substances, and heavy metals. Moreover, it contains high amount of copper compounds. Various methods, such as chemical precipitation, ultrafiltration, reverse osmosis, ion exchange, biological processes and adsorption are used to eliminate and remove copper ions inside the waste water. Closed recirculating systems may be developed as an alternative to flow through systems in many industrial activities to remove heavy metals.

Сточные воды, возникающие в результате промышленной деятельности, очень опасны для живых организмов из-за наличия высокотоксичных веществ и тяжелых металлов. Кроме того, они содержат большое количество соединений меди. Для устранения и удаления ионов меди внутри сточных вод используются различные методы, такие как химическое осаждение, ультрафильтрация, обратный осмос, ионный обмен, биологические процессы и адсорбция. Замкнутые рециркуляционные системы могут быть разработаны в качестве альтернативы потоку через системы во многих промышленных мероприятиях по удалению тяжелых металлов.

Keywords: adsorption, activated carbon, copper, water treatment, closed recirculating system.

Ключевые слова: сточные воды, наноразмерные, рециркуляционные системы.

Aim: The main aim of this study is to study the ability of removal of *Cu (II)* from aqueous solutions in a closed recirculating system using cotton fabrics with nano-sized activated carbon.

Methods: 1. Nano-sized active carbon was obtained from nut shells. 2. Nano-sized activated carbon was incorporated into the cotton fabrics. 3. Cotton fabrics with nano-sized activated carbon was used a sorbent to investigate of Cu (II) from aqueous solutions in batch sorption experiments.4. Optimum adsorption conditions were determined for experimental parameters 5. Adsorption isotherms and adsorption kinetics were applied to analyze the experimental data. 6. Cotton fabrics with nano-sized activated carbon were characterized by Scanning Electron Microscopy (SEM) images and Electron Dispersive Spectroscopy (EDS). 7. Removal of Cu (II) aqueous solution in the closed-recirculating water system was investigated using cotton fabrics with nano-sized activated carbon in the optimum experimental conditions.

Results: It can be concluded that the values of optimum experimental parameters for adsorption capacity of Cu(II) on cotton fabrics with nano-sized activated carbon in batch sorption method are as following: contact time (360 min) , initial concentration of adsorbate (100 mg/L) and pH (5) at room temperature. When the adsorption results were examined, it was determined that the most suitable isotherm model fitting to the isotherm and correlation constants was the Langmuir adsorption model. The results show that pseudo-second-order kinetic fit for the sorption of Cu(II) on cotton fabrics with nano-sized activated carbon. The Pseudo-second-order kinetic model was suitable for all the data. Scanning Electron Microscopy (SEM) images and Electron Dispersive Spectroscopy (EDS) results were obtained by examining the surface morphologies of fabrics used for adsorption studies.

Conclusions: The process of Cu(II) sorption on cotton fabrics with nano-sized activated carbon can be chemisorptions. Both SEM images and EDS results supported the adsorption studies. It can be used to remove Cu (II) from aqueous solutions in a closed recirculating system using cotton fabrics with nano-sized activated carbon.

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