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Studying synthesis of a chelate-forming sorbent based on urea-formaldehyde and diphenylcarbazone

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In this research work, the synthesis of a new type of chelating sorbent based on the cross-polycondensation reaction of urea, and formaldehyde with diphenylcarbazone in an alkaline medium and the study of its various properties have been studied. When the effect of temperature on the synthesis of this new chelating sorbent has been studied, the optimal temperature is 90°C, the duration of time is 1.5-2 h, and the molar ratio of the starting materials is respectively: urea, formaldehyde (2:5) and diphenylcarbazone. It is obtained in 0.1:0.2:0.3 mol ratios. The static exchange capacity of the chelating sorbent is 4.3 mg/eq. for 0.1 N NaOH solution. In addition, the sorption levels of ions such as Cu(II), Zn(II), and Ni(II) have also been determined. The influence of the environment on the sorption process of this synthesized chelating sorbent with Cu(II) ions has been observed. The structure of the newly synthesized sorbent and the sorption of Zn (II) and Cu (II) ions in the solution with the help of the sorbent have been studied, and the formation of complex compounds in the sorbent phase is based on the change of vibration frequencies according to the results of IR-spectrum analysis. The IR results confirm that this sorbent contains OH groups, primary amides (attached melamine ring), and R-O-H group. The surface morphology of this sorbent has been studied by SEM analysis. The Langmuir and Freundlich isotherms of the sorption process of the chelating sorbent for Cu (II) ions have been studied and analyzed. The obtained results also confirm that the possibility of using KF-DK as a sorbent for the sorption of d-metals from metallurgical wastewater.

Keywords: Urea, Formaldehyde, Diphenylcarbazole, Sorbent, SEM analysis, IR-spectrum analysis