



## Study survey of cupric oxide nanoparticles in removal efficiency of ciprofloxacin antibiotic from aqueous solution: adsorption isotherm study

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### ABSTRACT

Antibiotics are considered among the major pollutants in water environments. The antibiotics along with the sewage, pharmaceutical industries water waste, veterinary clinics and hospital sewages noticeably enter into the water resources and the environment. The objective of this study was to investigate ciprofloxacin removal efficiency from aqueous solutions by using cupric oxide nanoparticles. The effects of pH (3–11), CuO nanoparticles dosage (0.01, 0.03, 0.05, 0.07, 0.09 and 0.1 g/L), contact time (15, 30, 45, 60, 75, 90 and 120 min) and the initial antibiotic concentration (10, 25, 50, 100, 150 and 200 mg/L) were assessed on ciprofloxacin removal efficiency in laboratory. Under optimal conditions of concentration 10 mg/L, pH = 7, CuO nanoparticles dosage 0.1 g/L and contact time 60 min, the removal efficiency was 77% and  $q_m$  of the CuO nanoparticles was 105 mg/g. The process of ciprofloxacin adsorption on CuO nanoparticles was depended on Freundlich adsorption isotherm more than other isotherms (Langmuir, Temkin and Harkins–Jura). On the basis of the obtained results, it can be concluded that CuO nanoparticles adsorption process can be used as a novel method for treating wastewater contaminated with drug sources.

*Keywords:* CuO; Adsorption; Ciprofloxacin; Isotherm

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