



Impact of Remediation of Cu(II) and Zn(II) in aquatic environment using single and mixed surfactants

*¹Nura C.S., ¹Chattree A., ²Singh R.P.

¹Department of Chemistry, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad 211007, India

²Department of Chemistry, St. John's College, Agra 282002, India

Abstract:The removal of Cu(II) and Zn(II) from water and wastewater sample is of paramount significance because of its lethal repercussion when present high concentration. In the present study single and mixed surfactants were applied to remove Cu(II) and Zn(II) and analyse its accessory and synergistic effect in ionic –nonionic binary systems. The effect of pH was profound and removal percentage triggered around pH 4 to 6. Langmuir, Freundlich and Dubinin-Radushkevich-Kaganer (DKR) Isotherms were studied. Adsorption equilibrium of the metal ion reveals that data were well fitted to both Langmuir and Freundlich Isotherms. Maximum monolayer capacity q_{max} obtained from Langmuir model was found to be appreciably high for Cu(II) and Zn(II) and was evaluated as 5 mg.g^{-1} and 5.88 mg.g^{-1} when SDBS (Sodium dodecyl benzene sulphonate) was modified with Triton X-100 and Tween 80 respectively in a ratio of 4:1 was found to show removal efficiency of 98.66% and 98.58% respectively for Cu(II) and Zn(II). CTAB (Cetyltrimethyl ammonium bromide) both individually and in adjunct with Triton X-100 and Tween-80 showed a retarded response in the removal of both metals. Negative enthalpy and Gibbs free energy indicated exothermic and spontaneous process. Maximum activation energy was noted for Cu(II) and Zn(II) with SDBS+Triton X-100 and SDBS+Tween 80. Pseudo second order and intraparticle diffusion model were subjected to analyse the adsorption kinetics. Pseudo second order was asynchronous with experimental data. Noticeable boundary layer thickness was found to be appreciably high. It was identified that mixed surfactants of SDBS comparatively at a lower dosage were efficient adsorbent than unmodified SDBS, CTAB and mixed surfactants of CTAB.

Keywords : Adsorption, Copper and Zinc, ionic and mixed surfactants, Adsorption Isotherms, Kinetics.