



Thermodynamic behavior of adsorption of copper (II) ion on Wuyi Rock Tea Dreg

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ABSTRACT

In this study, the adsorption behavior of copper (II) ion on the dregs of Wuyi Rock affected by various parameters such as initial pH, adsorption time, reaction temperature and its initial concentrations were investigated. Wuyi Rock tea dreg shows a fine adsorbed ability for copper (II) ion. The adsorption equilibrium time was close to 60 min. The adsorption efficiency of copper (II) ion on Wuyi Rock tea dreg was sharply increased with the increasing reaction temperature. The pH value is a significant factor to influence the adsorption of the copper (II) ion on Wuyi Rock tea dreg compared with initial concentration of copper (II) ion, adsorption time, and temperature. The change of pH_{zpc} of the tea dreg before and after copper (II) ion adsorption indicates that chemical adsorption plays a dominant mechanism. The optimal pH of 4.0 was found. Both models of Langmuir and the Freundlich could perform the experimental data conducted; however, Langmuir model had the better correlation coefficient than Freundlich model did at different temperatures. Based on the thermodynamic parameters of ΔG^0 value between 30 and 50°C, it indicates the adsorption of copper (II) ion on tea dreg was belonging to the spontaneous reaction. The positive ΔH^0 and ΔS^0 , respectively, represents that endothermic nature and increasing entropy were existed in the copper (II) ion adsorption on tea dregs. Fourier transform infrared analysis proves that the variations of the intensity for the functional group like the C–H, C=O bond and the C–O bond were attributed to the metal binding on tea dregs.

Keywords: Wuyi Rock tea dreg; Copper (II) ion; Adsorption; Thermodynamic

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