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Kinetic and Thermodynamics of Sorption of 5-Fluorouracil (5-Fl) on Carbon Nanotubes

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Abstract : The aim of this study was to understand the interaction between multi-walled carbon nano tubes (MCNTs) and anticancer agents and evaluate the drug-loading ability of MCNTs. Batch adsorption experiments were carried out for adsorption of 5-Fluorouracil (5-FL) using MCNTs. The effect of various operating variables, viz., adsorbent dosage, pH, contact time and temperature for adsorption of 5-Fluorouracil (5-FL) has been studied. The Freundlich adsorption model was successfully employed to describe the adsorption process. It was found that the pseudo-second-order mechanism is predominant and the overall rate of the 5-Fluorouracil (5-FL) adsorption process appears to be controlled by the more than one-step. Thermodynamic parameters such as free energy change (ΔG°), enthalpy change (ΔH°) and entropy change (ΔS°) have been calculated respectively, revealed the spontaneous, endothermic and feasible nature of adsorption process. The results showed that carbon nano tubes were able to form supra molecular complexes with 5-Fluorouracil (5-FL) by π-π stacking and possessed favorable loading properties as drug carriers.

Keywords : drug, adsorption, anticancer, 5-Fluorouracil (5-FL)
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