Influence of Dextrose Monohydrate on the Optical Properties and Adsorption Activity of $Ni_{0.6}Zn_{0.2}Sb_{0.2}Fe_2O_4$ Nanoferrites: Towards Multifunctional Applications

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Text S1

3.8. Adsorption isotherm

The Freundlich isotherm is a complex model. This model considers multilayer adsorption on heterogeneous surfaces. The adsorption process is non-ideal and reversible with the presence of interaction between the adsorbed molecules. The non-linear equation of this model is described by Eq. (s1).[1]

$$q_e = K_F C_e^{1/n} \text{ (Freundlich)}, \quad \text{(s1)}$$

where K_F is the Freundlich constant and n is the adsorption intensity. The value of n gives an insight into the degree of non-linearity between the solution concentration and adsorption. If $n = 1$, then the adsorption is linear. If n < 1 indicates that the adsorption process occurs via chemical interactions; however, if n >1, then the adsorption takes place through a physical process.[2] Also, the Temkin isotherm model accounts for the adsorbate-adsorbent molecules. As an outcome of this interaction, the heat of adsorption of all molecules in the layer decreases linearly with coverage. Moreover, a uniform distribution of binding energy characterizes the adsorption.[3] The non-linear Temkin isotherm model is expressed in Eq. (s2).[4]

$$q_e = \frac{RT}{b_T} \ln (K_T C_e) \text{ (Temkin)}, \quad \text{(s2)}$$

where b_T is the coefficient related to the sorption heat (J.mol^{-1}), and K_T is the equilibrium binding constant (L.mg^{-1}). Typical adsorption energy, $\frac{RT}{b_T} \ln (K_T)$. T is the absolute temperature in K and R is the gas constant (8.314 J/mol. K).

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