



## Sorption and desorption of tetrabromobisphenol-A on acidic montmorillonite (K10)

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### ABSTRACT

This work was to examine adsorption of tetrabromobisphenol-A onto acidic montmorillonite (K10) which had been considered as a potential adsorbent for removal of organic pollutants. The Langmuir, Freundlich, Langmuir–Freundlich, and Dubinin–Radushkevich models were applied with determination of sorption and desorption equilibrium isotherms and isotherms constants. The discrimination had been performed by means of various statistics. The results showed that Freundlich and Langmuir–Freundlich models described the sorption isotherms better than Langmuir model. Meanwhile, desorption hysteresis index calculated from Freundlich model was above zero and increased with increasing temperature, indicating occurrence of hysteresis. Preliminary to the isotherms data, adsorption kinetic had been gathered and tested using pseudo-first-order, pseudo-second-order, intra-particle diffusion, and double-exponential models (DEMs). From the kinetic studies, sorption process was completed in 48 h, and followed pseudo-second-order model and DEMs. Cationic surfactant in aqueous solution had positive effect on adsorption process, and the metal cations promoted sorption capacity in the order:  $\text{Ni}^{2+} > \text{K}^+ > \text{Zn}^{2+} > \text{Ca}^{2+} > \text{Na}^+$ . The optimum adsorption capacity was provided by the condition of pH 3,  $T = 288 \text{ K}$ , and  $I = \text{Ni}^{2+}$ . Additionally, the thermodynamic parameters indicated the sorption was exothermic and spontaneous. The interaction between K10 and TBBPA was investigated using FTIR.

*Keywords:* K10; Adsorption; Kinetics; Isotherms; FTIR

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