

Adsorption mechanisms of pharmaceutical residues on organic-inorganic hybrid adsorbents

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The main objective of this research is to carry out a carefully designed parametric study of the physical and chemical factors that underlie three components interaction phenomena of pharmaceutical residues, dissolved organic matter (DOM) and surface of organic-inorganic hybrid adsorbents that comprise organic moieties within inorganic frameworks, such as functionalized superparamagnetic mesoporous silicates, periodic mesoporous organosilica (PMOs), graphene oxide modified mesoporous silicate, etc. by adsorption/desorption phenomena. Hydrophilic and hydrophobic functional groups were post-grafted on organic-inorganic hybrid adsorbents and evaluated their effects on adsorption/desorption of four types of pharmaceutical residues (hormones, antibiotics, antilipidemics, and non-steroidal anti-inflammatory drugs) in combination with fractionated DOM and surrogate DOM in both single and mixed solute conditions. Selective adsorption of synthesized adsorbents was evaluated via the mixed pharmaceutical residues solution with / without co-existing natural organic compound in aquatic environment. Obtained data will be used for stimulation of mobility, fate and transportation of pharmaceutical residues via interaction with NOMs and accumulation in various active surfaces. Finally those obtained information of adsorption mechanisms could be applied for development of high selective adsorbents for encapsulation, removal and recover pharmaceutical residues for water and wastewater system.