

SORPTION CHARACTERISTICS OF CADMIUM IONS ON BURNT BRICK CLAY PARTICLES

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Brick particles, among many naturally available substances, show a significantly high removal of metal ions, anions and organic molecules due to the availability of active sites. Interaction of chemical species with brick particles, and hence the extent of adsorption, depends on environmental conditions, such as different sources and different locations in the pit. Consequently, pre-treatment and chemical modification methods could affect the efficiency of the removal process.

This report summarizes the results of carefully controlled experiments, performed under different experimental conditions, for the investigation of the sorption characteristics of raw brick clay particles, and those fired at different temperatures with cadmium ions. Variation of stirring time and settling time on the extent of sorption of cadmium ions reveals that 10 min stirring and 120 min settling would be optimum. Among many firing temperatures, brick clay fired at the temperature range of 0 °C to 500 °C provides the most efficient sorption of cadmium ions. At these temperatures, it is expected that incomplete combustion of organic matter present in brick clay would have decomposed exposing more sites for adsorption. Further, change in the pH of solution media does not affect the extent of sorption, and hence control of pH is not necessary. Further, concentration dependent experiments conducted at ambient temperature indicate that both the Langmuir and Freundlich adsorption models, which promotes the monolayer adsorption is and multilayer adsorption respectively, are obeyed by the cadmium-brick clay particle system. Further, thermodynamics experiments indicate that the adsorption process is spontaneous, and endothermic. Kinetics experiments indicate that the Cadmium removal is pseudo-second order and obey the modified intraparticle diffusion model.