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PERFORMANCE INVESTIGATION OF FURNACE BOTTOM ASH AS A FILTER MEDIA FOR PHOSPHATE REMOVAL

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Abstract

This study investigates the capability of furnace bottom ash (FBA) as a filter media for phosphorus removal from wastewater effluents. Lab-scale studies were conducted, in which a mass of FBA was brought into contact with the phosphate solution (a predominant form of phosphorus in wastewater) in batch experiments and lab-scale filter. Intraparticle Diffusion Model (IPD) was applied and revealed that the mechanism of phosphate adsorption onto FBA consist of three phases; film phase occurred in the external surface and intraparticle diffusion phases take place in the wide pores and microspores. A Point Zero Charge (PZC) study was conducted and indicated that the FBA acts as anion exchanger and develops negative charge when the pH more than 9. Based on the PZC outcomes the FBA efficiency was regenerated by two washing methods (continuous and intermittent) with deionized water solution at pH 9.5 and 10. The intermittent washing method gave better results as the FBA regenerate 95% of its efficiency. FBA was achieved the phosphate permissible limit (0.1 mg/l) in synthetic solution at 150 min. While, in real wastewater sample was achieved it in 180 min. The FBA washing method based on PZC can be adopted as a strategy for absorbents efficiency regeneration and phosphorus recovery.

Key words: filter media, furnace bottom ash; phosphate sorption, wastewater treatment

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