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Preparation of Adsorbent with High Removal Ability for Phosphate Ion from Blast Furnace Slag using Alkali Fusion

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We attempted to convert blast furnace slag into an adsorbent for phosphate removal using the alkali fusion method. The slag was mixed with NaOH powder (NaOH/Slag=1.6), and the mixture was heated at 600℃ for 6 h to prepare the precursor, which was then stirred at room temperature in various aqueous solutions: distilled water, 1 M NaOH, 1 M NaCl, 1 M $NaNO_3$, 1 M Na_2CO_3 and 1 M Na_2SO_4, to synthesize the adsorbent. Regardless of the reaction solution, products were synthesized, including hydrocalumite and calcite. Phosphate ions in solution were removed as calcium phosphate minerals using all obtained adsorbents. The PO_4^{3-} adsorption abilities of all products obtained and the solution pHs after removal were similar. The adsorbents could adsorb PO_4^{3-} selectively in the presence of F^-, Cl^-, Br^-, NO_3^- and SO_4^{2-}. We have prepared a new inorganic adsorbent with high affinity for phosphate from wastewater.

Key Words : Blast furnace slag, Alkali fusion, Phosphate removal, High selectivity