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Frontier research and prospect of phosphate adsorption in wastewater by red mud: a review

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ABSTRACT

Red mud is a red-coloured, mud-like solid waste discharged from the industrial aluminium production process, which has a high output and is a pollutant. It exhibits a small particle size and a large specific surface area and contains active oxides. In this study, "red mud" and "phosphate" were used as keywords to retrieve research hotspots and progress for the red mud as a phosphate adsorbent in the past 10 y. CiteSpace and VOSviewer visual literature analysis software were used to cluster countries, institutions, authors, and keywords. Related patents showed that research on the phosphate adsorption performance of red mud has considerably increased since 2013 and that China has made a significant contribution. This paper summarises the main chemical composition and modification methods of red mud and collects from literature the relevant mechanism research and data on phosphate adsorption/desorption using red mud as an adsorbent. Summarising data on the microstructure of red mud adsorbent, it is found that there are few reports on red mud as adsorbent based on density functional theory. This study suggests that the problem of the steric hindrance of the red mud adsorbent in the phosphate adsorption process needs further research.

Keywords: Red mud sorbent; Modifying methods; Mechanism research; Phosphate adsorption; DFT

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