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A study on a closed - loop production of coagulants and adsorbents without secondary wastes from Vietnamese red mud

Red mud is the waste from alumina production using Bayer technology, which is considered to be a serious environmental pollutant (NORM). Therefore, the study of red mud reuse and radiation safety assessment has long been considered by scientists. In this paper, a comprehensive method for manufacturing adsorbents and coagulants from Vietnamese red mud in a closed loop without accompanying secondary wastes: The red mud was dissolved in 3M sulfuric acid at 85 ° C for 2 hours, solution was separated and used as a coagulant, the solid residue was washed, calcined at 700 ° C for 2 hours, then used as a adsorbents for remove of dyes. At the same time, to evaluate the applicability of the adsorbent for watertreatment and coagulants the in waste water treatment with the radiation safety assessment. The application of adsorbents of natural origin, especially industrial waste, is one of the most attractive solutions for wastewater treatments due to its high socio-economic advantages.In this study, the adsorption capacity of acid activiated red mud for some conventional dyes such as Reactive Red 195 and Direct Yellow 132 was investigated. The results showed that, for both dyes, pH 5 is most suitable for the adsorption processes. The adsorption kinetic was based on the pseudo second-order kinetic equation. The adsorption data were well matched to Langmuir isotherm model; the maximum adsorption capacities were found to be 48.54 and 84.31 (mg/g) for Reactive Red 195 and Direct Yellow 132, respectively. Coagulants for wastewater treatment are very effective: In particular, for effluent with high COD content, it decreased from 6746 mg / l to 687 mg / l (about 90%), for sewage PO43 decreased from 56.09 mg / l to 21.00 mg / l (about 63%). The coagulant was tested at the Elmich sewage treatment plant of the European Group Elmich Appliances, and the results were achieved by the Vietnamese standard for industrial wastewater.

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