

Valorization of Moroccan bentonite deposits: adsorption and stabilization of phenol by bentonite

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Morocco is one of the most olive oil producing Mediterranean countries. This industry, which is so beneficial to the national economy, leaves two toxic and non-biodegradable residues (liquid/solid). “Margines” is a current liquid pollutant that has been listed by the United States Environmental Protection Agency (EPA). Among the priority pollutants. The classical methods used for phenol removal are expensive or limited to large-scale applications such as biological and thermal decomposition methods. The main objective of this work is to contribute to the reduction of contamination of phenolic compounds contained in “margins” by the adsorption process on bentonite. The “margins” used in the studies were collected from a semi-modern oil mill located in the Nador-Morocco region. The results of the physico-chemical analyses showed that the effluents of the oil mills are highly polluted, in particular the suspended solids, COD, and iron and copper contents are around 154.82 mg/l and 31.72 mg/l, respectively. Through XRD the mineralogy of bentonites studied reveals the existence of two types of montmorillonites. Theoretically, the diffraction peaks (001) of the montmorillonite appear at 15 Å and at 12 Å, corresponding to calcium and sodium pole, respectively. The specific surface area of the bentonite used is characterized by a large area varying between 127.62 m²g⁻¹ and 693.04 m²g⁻¹ which is due to the presence of hydrated interleaved cations. This surface is likely to increase in aqueous solution depending on the solid/liquid ratio that modulates the degree of hydration. Samples of “margins” mixed with raw bentonites at different percentages vary between 5% and 100%. The potential of Moroccan bentonite for the adsorption of 9.17 g/l phenol from aqueous solutions was investigated. Adsorption tests have confirmed the effectiveness of these natural minerals in reducing phenolic compounds ranging from 8.72 to 76.23% contained in the “margins”.

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