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Surface modification of olive stone wastes for enhanced sorption properties of cadmium and lead ions

Mahmoud Belalia[1*], Meriem Bendjelloul[2], Abdallah Aziz[3], El hadj Elandaloussi[2]

[1] *SEA2M Laboratoiry, University of Abdelhamid Ibn Badis, 27000 Mostaganem, Algéria*
[2] *ESNVTA Laboratoiry, Ahmed Zabana University Center, Bourmadia, 48000 Relizane, Algéria,*
[3] *Laboratory for the Valorization of Materials, University of Abdelhamid Ibn Badis, 27000 Mostaganem, Algéria*

ABSTRACT

This paper reports the synthesis and characterization of an efficient anionic olive stone wastes-based material as new ion-exchanger adsorbent. The olive stone wastes were subjected to an alkaline pretreatment in order to enhance their reactivity towards maleic anhydride. The maleated material MOS was characterized by FTIR, ^{13}C NMR, TGA and DSC. The resulting sodiated material NaMOS was subjected to batch experiments in order to evaluate its cadmium and lead removal efficiency. Adsorption experimental data showed a uniform and rapid process. Both Langmuir and Freundlich isotherm models were found to fit adequately the equilibrium isotherm data. The sorption capacities reached 240.96 mgCd g^{-1} and 127.38 mgPb g^{-1}. Thermodynamic parameters showed that the process was exothermic and the adsorption occurred spontaneously. Desorption experiments show a quantitative recovery of the metal ions from NaMOS material.

Keywords: alkaline treatment; functionalization; metal removal; olive stone; regeneration; sorption.