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Preparation, characterization and application of H3PO4 activated maize tassel for the remediation of eutrophic phosphorus

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Technologies for PO43- removal from contaminated waters, such as chemical precipitation with lime, are expensive. In this study, the feasibility of utilizing low-cost activated maize tassel for the adsorptive removal of phosphate was assessed. Raw maize tassel powder was impregnated with H_3PO_4 in the ratios 0.5:1, 1:1, 1.5:1, 2:1 and 2.5:1 and activated at 600 and 800°C under an inert atmosphere of N^2. The activated products were characterized by BET. Activation resulted in an increase in specific surface area and porosity. CAT4 (2:1) activated at 600°C) with SBET 803.8 m^2/g and pore size 2.22 nm was further characterized by SEM and used for adsorption studies. Batch experiments were performed to study the removal of phosphate from simulated samples; the optimal parameters were found to be: contact time of 90 min, pH 7 and adsorbent dosage of 1.5 g per 100 mL solution. The adsorption data were fitted to the Langmuir isotherm model (R^2>0.99), yielding an estimated adsorption capacity of 15.31 mg PO_4^{3-} per g adsorbent. The activated product was successfully applied for the remediation of phosphate in selected samples from 3 sewage treatment plants in Northern Pretoria.

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Two-phase olive pomace as an interesting source of biophenols

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Olive oil consumption is associated with a number of health enhancing effects such as the reduction of chronic diseases and the fight against the risk of heart disease. To produce olive oil, a new industrial process called the "two-phase centrifuge system" allows for the recovery of one hand the olive oil and on other hand a wet pomace also called alperujo composed of vegetation waters and olive pieces. The aim of this investigation was to evaluate alperujo as a potential source of phenolic compounds using a rapid, reliable and efficient analytical method. Target antioxidant compounds were followed with UHPLC-DAD/ESI-MS^n in order to identify and quantify biophenols. The results obtained showed the identification of 35 phenolic compounds in 12 minutes with a tentative of identification of new molecules. Furthermore, the aglycon and glycosidic forms of hydroxytyrosol were quantified in high concentration (3 mM). These results could lead to a fast promotion of phenolic compounds in olive oil by-products in terms of a new economic source of interesting phenolic antioxidants for the health, cosmetic and food sectors. .

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