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Natural products as adsorbent for wastewater valorisation

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With regard to Morocco's national programme for treatment of waters (PNALEEU) and the deal with water shortage and bad quality of drinking and agricultural water, these research aim to look into new technologies to clean wastewater and polluted waters from heavy metals and organic contaminants in order to increase the countries resources of clean water available for human consumption and agricultural usage. Various reports attest to the failure of the different treatment processes used to clean waste waters (WWs); raising concern about the remaining pollutants in WWs released in the rivers or reused in agriculture. Usage of local material could improve the quality of WW. In particular, the efficiency of a water filtering technique is studied using selected natural materials prepared from vegetable waste as well as some hydroxyapatite, apatite and apatite-modified materials. The study focus on adsorption properties to be compared with some commonly used adsorbents. Tests to remove pollutants from raw and treated WWs have been conducted. Adsorbents have been prepared from apatite or some vegetable waste of nuts and/or fruits by pyrolysis (500-700°C) at a reduced level of oxygen or by chemical treatment. In this process, a kind of biochar polymer will form and these materials have been grinded to different diameter of granules, fractions of 0-45 and 45-100 µm and tested. Individual tests of adsorption have been performed with each pollutant and different adsorbents. Isotherms of adsorption have been derived in batch experiments. Different equilibrium concentrations of the pollutants will enable us to draw the isotherm and to compare different common models such as Freundlich or Langmuir. The parameters of adsorption have been deduced from the more fitting model to the data. Effects of different physical-chemical parameters such as pH, cation exchange capacity (CEC), conductivity, etc., on the performance of the tested sorbents have been studied using experimental designs.

Recent Publications

1. El Marouani M, El Fakir L, La Yakhaf S M, El Hrech N, Dahchour A, Sebbahi S, El Hajjaji S and Kifani Sahban F (2017) Removal of textile dyes from aqueous solutions by lignin and its derivative charcoals: Characterization, adsorption kinetics and isotherms. *Desalination and Water Treatment* 81:265-273.
2. Akartasse N, Mejdoubi E, Razzouki B, Azzaoui K, Jodeh S, Hamed O, Ramdani M, Lamhamdi A, Berrabah M, Lahmass I, Jodeh W and El Hajjaji S (2017) Natural product based composite for extraction of arsenic (III) from waste water. *Chemistry Central Journal* 11(1):33.
3. Foulal S, El Hajjaji S, Trif L, Sabbar A, Chtioui I, De Caro D, Faulmann C and De Caro P (2017) Molecular conductors as nanoparticles in the presence of long-chain alkyl imidazolium salts or amphiphilic molecules: Synthesis and thermoanalytical studies. *Journal of Thermal Analysis and Calorimetry* 127(3):1879-1888.
4. El Bouabi Y, Farahi A, Labjar N, El Hajjaji S, Bakasse M and El Mhammedi M A (2016) Square wave voltammetric determination of paracetamol at chitosan modified carbon paste electrode: Application in natural water samples, commercial tablets and human urines. *Materials Science and Engineering C* 58:70-77.
5. El Fakir L, Flayou M, Dahchour A, Sebbahi S, Kifani Sahban F and El Hajjaji S (2016) Adsorptive removal of copper (II) from aqueous solutions on phosphates: equilibrium, kinetics, and thermodynamics. *Desalination and Water Treatment* 57(36):17118-17127.

Biography

Souad El Hajjaji has completed her PhD from INP of Toulouse, France. She is the Director of Research Centre in Water, Natural Resources, Environment and Sustainable Development at Mohammed V University in Rabat. She has published more than 80 papers in reputed journals and has been responsible for LIA; she is the Coordinator of an international Master's with the University Paul Sabatier-Toulouse (France) in Analytical Sciences and Environment. She is the General Secretary of the Moroccan Association for the Environment and Sustainable Development; Vice President of Morocco Globe Association for Environment and Member of the Coordinating Committee of the Moroccan Coalition for Water (COALMA).

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