الجمهورية الجزائرية الديمقراطية الشعبية
وزارة التعليم العالي والبحث العلمي
جامعة قسنطينة 1 – الإخوة منتوري
كليـــــــــة العلوم الد قيـقة

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA
MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH
Constantine 1 University – Frères Mentouri
Faculty of Exact Sciences

ANNONCE DE SOUTENANCE DE THESE

Mme ***BOUSSEBOUA Radja,***

Soutiendra sa thèse de Doctorat en Sciences en Chimie

Spécialité : « Chimie Analytique et environnement »

Intitulée : « Elaboration de matériaux de type hydroxydes doubles lamellaires et composites. Application à l'élimination des ions phosphates et des ions Cr(VI) dans l'eau»

Date : Le Lundi 29 Avril 2024.

L i e u : A La Salle de conférences de la faculté des sciences Exactes sise à Chaab erssas. Université Constantine 1 Frères Mentouri.

Devant le jury :

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A b s t r a c t:

The present work is part of the development of new, effective and practical adsorbent materials for water treatment. The main objective is the removal of phosphate and Cr(VI) ions by materials like Mg-Fe layered double hydroxides (LDHs) and calcite-iron-oxy/hydroxide composites. The materials are synthesized at pH: 12 and pH:10, and characterized by various textural and structural characterization methods (DRX; ATG/DTA, BET, ATR-FTIR and pHPZC). The removal of phosphate and Cr(VI) ions is studied through macroscopic (batch) and spectroscopic (ATR-FTIR) analyses. The effects of pH, temperature and competing ions are evaluated. Adsorption kinetics and isotherms are studied. Characterization of the synthesized materials shows that they are mesoporous. Specific surface area values suggest that the synthesized materials are classifed in the order: calcite-goethite composite prepared at pH: 10 (245.94 m2 /g) > calcite-goethite composite prepared at pH: 12 (172.96 m2 /g)> Mg-Fe LDH prepared at pH:12 (125.24 m2 /g)> and Mg-Fe LDH prepared at pH :10 (123.47 m2 /g)> calcite-hematite composite prepared at pH: 10 (47.62 m2 /g)> calcite-hematite composite prepared at pH: 12 (37.30 m2 /g). In general, phosphate and Cr(VI) removal by the synthesized materials is favorable at acidic and weakly basic pH. Synthesized materials are more effecient for removing phosphate ions. Materials prepared at pH: 12 are the best adsorbents for phosphate removal. The maximum removal capacities obtained are 154.32 mg/g in the case of calcite-goethite composite, 137.55 mg/g in the case of calcite-hematite composite and 102.88 mg/g in the case of Mg-Fe LDH. The maximum Cr(VI) removal capacity (28.08 mg/g) is obtained in the case of calcite-goethite composite prepared at pH: 10. The conditions under which Mg-Fe LDHs are prepared have

an effect on their ability to remove both phosphate and Cr(VI); their calcination at 500°C implies a decrease. According to maximum of the removal capacities, the efficiency of the synthesized materials for phosphate removal at acidic pH follows the order: composite calcite-goethite prepared at pH: 12 > composite calcite-hematite prepared at pH: 12 > HDL Mg-Fe prepared at pH: 12 > composite calcite-goethite prepared at pH: 10 > HDL Mg-Fe prepared at pH:12 and calcined at 500°C> HDL Mg-Fe prepared at pH: 10~ composite calcite-hematite prepared at pH: 10 > HDL Mg-Fe prepared at pH :10 and calcined at 500°C. At neutral to weakly basic pH, the efficiency of the synthesized materials for phosphate ions follows the order: calcite-goethite composite prepared at pH: 12 > calcite-hematite composite prepared at pH: 12 > calcite-goethite composite prepared at pH: 10 > Mg-Fe LDH prepared at pH: 12~ calcite-hematite composite prepared at pH: 10> Mg-Fe LDH prepared at pH: 10 > Mg-Fe LDH prepared at pH: 12 and calcined at 500°C ~ Mg-Fe LDH prepared at pH: 10 and calcined at 500°C. In the case of Cr(VI) ions, at acicid pH, the efficiency of the synthesized materials follows the order: calcite-goethite composite prepared at pH: 10 > Mg-Fe LDHs prepared at pH: 12 or pH: 10 > calcite-goethite composite prepared at pH: 12> Mg-Fe LDH prepared at pH: 12 and calcined at 500°C > Mg-Fe LDH prepared at pH: 10 and calcined at 500°C > calcite-hematite composite prepared at pH: 12 or pH: 10. At neutral pH, the prepared LDH can not be used for Cr(VI) removal. The prepared calcite-goethite composites are more efficient their the prepared calcite-hematite composites.