EuroSciCon

8th Edition of International Conference on

Chemical Sciences

June 14-15, 2018
London, UK

Hanen Bessaies, Arch Chem Res 2018, Volume 2
DOI: 10.21767/2572-4657-C2-006

PREPARATION AND APPLICATION OF LDH INTERCALATED CELLULOSE NANOCOMPOSITE FOR REMOVAL OF ARSENATE AND ARSENITE IONS

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The key objective of this present study is to compare two new materials Zn/Al Layered double hydroxide (LDH) intercalated cellulose (CL) nanocomposite (CL-Zn/Al LDH) and Ca/Al Layered double hydroxides (LDH) intercalated cellulose (CL) nanocomposite (CL-Ca/Al LDH) for removal of arsenic (V) and (III). The CL-Zn/Al LDH and CL-Ca/Al LDH were characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Elemental analysis (EA), Brauner, Emmett and Teller method (BET), Transmission electron microscopy (TEM), Raman (RMN) spectrs. XRD (X-ray diffraction) analysis represented the crystalline nature of LDH nanocomposite and TEM analysis approved the formation of a sheet like structure of LDH for both sorbent. Various parameters including contact time, pH, adsorbent dosage, initial concentration and temperature were optimized to achieve maximum adsorption capacity. Adsorption kinetics results were analyzed using the pseudo first order, pseudo second order, intraparticles diffusion and the Boyd model. The adsorption isotherm results showed that the maximum adsorption capacity of As(V) (36.46 mg/g on CL-Zn/Al LDH, 36.29 mg/g on CL-Ca/Al LDH) and As(III) (30.15 mg/g on CL-Zn/Al LDH, 10.91 mg/g on CL-Ca/Al LDH) ions with both sorbents as judged from the Langmuir and Frendlich ($R^2 \geq 0.9$) model. Thermodynamic studies for As(III) and As(V) over CL-Zn/Al LDH and CL-Ca/Al LDH illustrated that the process of adsorption is spontaneous. It could be motionned that Zn/Al Layered double hydroxide (LDH) intercalated cellulose (CL) nanocomposite is more effective for As(III) removal than CL-Ca/Al LDH nanocomposite.

Biography

Hanen Bessaies is currently pursuing her PhD jointly in the department of chemistry, faculty of sciences of tunisia, Tunis El Manar University, tunisia and laboratory of green chemistry, Lappeenranta University of Technology, Finland. She has published few papers in high repute international journals.

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