

Accepted Manuscript

Chemically treated date stones for uranium (VI) uptake and extraction in aqueous solutions

Shadia M. Sirry, Fatemah Aldakhil, Omar M.L. Alharbi, Imran Ali



PII: S0167-7322(18)34637-3
DOI: doi:[10.1016/j.molliq.2018.10.018](https://doi.org/10.1016/j.molliq.2018.10.018)
Reference: MOLLIQ 9763
To appear in: *Journal of Molecular Liquids*
Received date: 8 September 2018
Revised date: 1 October 2018
Accepted date: 3 October 2018

Please cite this article as: Shadia M. Sirry, Fatemah Aldakhil, Omar M.L. Alharbi, Imran Ali , Chemically treated date stones for uranium (VI) uptake and extraction in aqueous solutions. Molliq (2018), doi:[10.1016/j.molliq.2018.10.018](https://doi.org/10.1016/j.molliq.2018.10.018)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Chemically Treated Date Stones for Uranium (VI) uptake and extraction in Aqueous Solutions

Shadia M. Sirry^a, Fatemah Aldakhil^a, Omar M.L. Alharbi^b and *Imran Ali^{a,c}

^aDepartment of Chemistry, College of Sciences, Taibah University, Al-Medina Al-Munawara 41477, Saudi Arabia

^bDepartment of Biology, Faculty of Sciences, Taibah University, Al-Medina Al-Munawara – 41477, Saudi Arabia

^cDepartment of Chemistry, Jamia Millia Islamia, (Central University) New Delhi, India

Abstract

In this study, the uptake and consequent extraction of U(VI) in aqueous solutions were investigated using chemically treated date stones (DS) as a low-cost, eco-friendly, locally available and effective natural adsorbent. Petroleum ether (PE), hydrochloric acid (HA), sodium carbonate (NaCO₃), a combination of PE and HA treatments and PE and NaC treatments were utilized to improve the adsorption capacity of DS for U(VI), which was determined spectrometrically after being complexed with 4-(2-pyridylazo)-resorcinol (PAR). The changes in the treated DS were characterized and compared with the raw material by Fourier transform infrared (FTIR) spectroscopy before and after the uptake process. The surface of the treated DS was observed using a scanning electron microscope (SEM) to illustrate the change in the surface feature after adsorption. Batch experiments were carried out in studies of U(VI) adsorption from aqueous solutions. The base treatment (NaCO₃ and PENA₃CO₃) of DS appeared to be the least successful in enhancing the uptake of U(VI), while the best result was obtained with DS-PEHA and DS-HA. The maximum adsorption capacity of DS was found to be 19.6 and 17.86 mg/g for a U(VI) uptake onto DS-PEHA and DS-HA, respectively at the equilibrium time of 120 min. The kinetic model conformed successfully to the pseudo-second-order equation, while the isotherm data was modeled best by the Langmuir equation for U(VI) adsorbed on most treated DS. The enrichment factor for the pre-concentration of U(VI) was found to be 50, and the maximum elution of U(VI) was performed with 2.0 M L⁻¹ of HNO₃.

Keywords: Date stones; Uranium; Uptake and Extraction; Kinetic; Isotherm; Adsorption capacity.

*: **Correspondence:** drimran_ali@yahoo.com; drimran.chiral@gmail.com

Download English Version:

<https://daneshyari.com/en/article/11262933>

Download Persian Version:

<https://daneshyari.com/article/11262933>

[Daneshyari.com](https://daneshyari.com)