

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى:

"اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ {1} خَلَقَ الْإِنْسَانَ  
مِنْ عَلَقٍ {2} اقْرَأْ وَرَبُّكَ الْأَكْرَمُ {3} الَّذِي عَلَّمَ  
بِالْقَلَمِ {4} عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمْ {5}"

صدق الله العظيم

**سورة العلق الآيات من (1-5)**

# **Dedication**

To the ones whom I care much for

To my parents

To the one who gave me faith,  
strength, pleasure

Love just by being there

To you

To the ones who contributed to my  
well being

To my colleagues

With love.

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Thanks everybody.

# Abstract

(English)

Zeolite samples were collected from Wadkawly in Gadarif region. These samples were characterized with respect to both physical and chemical properties. X-ray Diffraction Analysis (XRD) showed these samples to be composed of Thomsonite zeolite, exclusively. The samples were treated with strong brine solution to ensure that Na-zeolite is generated and used as the stationary ion exchange phase. Solutions containing 100ppm of the ions ( $\text{Pb}^{2+}$  or  $\text{Fe}^{3+}$  or  $\text{Ni}^{2+}$ ) were artificially prepared, then processed with the zeolite. Excellent extraction was achieved, with final residual concentration of 0.02 ppb, 3.0 ppb and 1.38 ppm for ( $\text{Pb}^{2+}$ ,  $\text{Fe}^{3+}$  and  $\text{Ni}^{2+}$ ) respectively. This gives extraction efficiency of  $\sim 100\%$ ,  $99.9\%$ , and  $98.6\%$ , for  $\text{Pb}^{2+}$ ,  $\text{Fe}^{3+}$  and  $\text{Ni}^{2+}$ , respectively. The relative efficiency is, therefore :

$$\text{Pb}^{2+} > \text{Fe}^{3+} > \text{Ni}^{2+}.$$

## الخلاصة

جمعت عينات من الزيوليت من ود كولي في منطقة القضارف. أجريت دراسة للخصائص الفيزيائية والكيميائية لهذه العينات. وقد بين التحليل بحيود الأشعة السينية أن هذه العينات تنتمي حصراً إلى فصيلة الزيوليت المعروفة "بالمسونيت". وجرت معالجة العينات بحلول الملح المركز للتأكد من إنتاج زيوليت الصوديوم (Na-Zeolite) الذي وظف كالطور الثابت في عملية التبادل الأيوني. وتم تحضير محاليل من الأيونات ( $\text{Pb}^{2+}$  و  $\text{Fe}^{3+}$  و  $\text{Ni}^{2+}$ ) تحوي (100 ppm) ثم عولجت بالزيوليت. وجد أن استخلاص هذه الأيونات تحقق بدرجة ممتازة، معطياً تراكيز نهائية هي 0.02 جزء من بليون و 3.0 جزء من بليون و 1.38 جزء من مليون للأيونات ( $\text{Pb}^{2+}$  و  $\text{Fe}^{3+}$  و  $\text{Ni}^{2+}$ ) و 98.6% و 99.9% و 100%، ويعطي هذا فعالية استخلاص ~ 100%، و 99.9% و 98.6% على التوالي. ومن ثم فإن الفعالية النسبية للاستخلاص هي:



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