Ain Shams University
Faculty of Science
Chemistry Department

GEOCHEMICAL STUDIES AND URANIUM MINERALS CONCENTRATION USING ORGANIC SURFACTANTS FROM RADIOACTIVE SYENITE ROCKS, EL-GARRA EL-HAMRA TUSHKI AREA, SOUTH WESTERN DESERT.

By

Enass Mohamed Mohamed El-Sheikh
B.Sc., M.Sc.

A THESIS

Submitted for the degree of
DOCTOR OF PHILOSOPHY
(Ph.D. in Chemistry)

TO

Chemistry Department
Faculty of Science
Ain Shams University

2006

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جامعة عين شمس
كليـــــة العلوم
قســـم الكيمياء

دراســة جيوكيميائيــة لتركيــز معــادن اليورانيــوم باســتعمال المركبــات السـطحية العضـوية مـن صـخور السـيانيت المشـعة، الجـارة الحمـراء، منطقة توشكي، جنوب الصحراء الغربية.

رسالة مقدمة من

إيناس محمد محمد الشيخ

ماجستير في الكيمياء العضوية

الى

كلية العلوم – جامعة عين شمس

للحصول على درجة دكتوراه الفلسفة في العلوم (كيمياء)
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شكر

أشكر السادة الذين قاموا بالاشراف على الرسالة و هم:

1- السيد الأستاذ الدكتور / محمد يوسف القاضى
2- السيد الأستاذ الدكتور / محمد عبد الحكم مهدى
3- السيد الأستاذ الدكتور / مرسى أحمد مرسى
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كذلك الهيئات الآتية:

1- هيئة المواد النووية
2- جامعة عين شمس- كليـــــة العلوم- قســـم الكيمياء
3- رئيس وزملاء معمل قياس العناصر الرئيسية – المعامل المركزية – أنشاص .

ABSTRACT

Enass Mohamed Mohamed El-Sheikh. GEOCHEMICAL STUDIES AND URANIUM MINERALS CONCENTRATION USING ORGANIC SURFACTANTS FROM RADIOACTIVE SYENITE ROCKS, EL-GARRA EL-HAMRA TUSHKI AREA, SOUTH WESTERN DESERT.

The main purpose of this work is to prepare different natural resins from the Egyptian plant remains. Cotton stalks (especially stem parts) were chosen because they are popular and widespread plant wastes in Egypt.

It is well known that the natural cellulose has low ionic exchange properties, due to its characterization by a small number of carboxylic group. Incorporation of different functional groups can promote its ionic exchange capacity. In this work, modification of cotton stalks by treating with sodium hydroxide and or/ mixture of sodium hydroxide /phenol has been used to increase the ion exchange capacity of such materials, by developing their swelling properties and decreasing their lignin content.

Experiments using modified liginocellulosic cotton stalks (natural resins) were conducted to study the adsorption of uranium, thorium and rare earth elements from El – Garra El- Hamra, (South Western Desert) sulfate leach liquor. Different trials were accomplished to prepare the modified liginocellulosic cotton stalks using chlorosulfonic acid, phosphorousoxy chloride and mixture of both, whether the cotton stalks were pretreated or not by NaOH or phenol.

The obtained results revealed that the modified natural resins adsorb from 2.41 to 43.56 g uranium /L and from 9.25 to 60.11g, thorium /L wet settled natural resin (w.s.r) from the sulfate leach liquor, respectively. Almost complete elution of uranium and thorium was achieved using 1M NaCl acidified with 0.25 M H_2SO_4.Thorium was

separated as thorium oxalate, while uranium was precipitated as becquerelite (7 UO_3.11H_2O).

Comparing the adsorption data of the natural ion exchanger, industrial one Amberlite I.R. 400 and a Chinese resin, it can be said that the synthetic ion exchange resin has an intermediate adsorption capacity (72Ug/L w.s.r) above the Chinese one (50 gU/L w.s.r.) and less than the "American one" Amberlite I.R. 400, (92gU/L w.s.r). Indeed, the prepared Egyptian natural resin is characterized by its low coast, available resources while keeping the environment clean.

Future goal

It is to apply the obtained promising laboratory results in the Nuclear Materials Authority. First in a semi pilot project and finally in a full pilot project plant in Nuclear Materials Authority.

CONTENT

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