سامية محمد مصطفى

شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

سامية محمد مصطفى

شبكة المعلومات الجامعية

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

سامية محمد مصطفى

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

سامية محمد مصطفى

شبكة المعلومات الجامعية

بعض الوثائق الأصلية تالفة

سامية محمد مصطفى

بالرسالة صفحات لم ترد بالأصل

B

١٢٧٥٦

Menoufiya University
Faculty of Science
Botany Department

MICROBIOLOGICAL LEACHING OF URANIUM FROM SOME EGYPTIAN ORES ALLOGA AREA, SOUTH WESTERN SINAI

A Thesis

Submitted in Partial Fulfillment for the Requirements of Degree of Master of Science in Microbiology

By

Maisa Mohamed Amin

Under the Supervision of

Dr. A. H. Hashad
Prof. of Geochemistry
Nuclear Materials Authority

Dr. E.M.Hussein
Prof. of Nuclear ores
Nuclear Materials Authority

Dr. Mohamed Ali Hefnawi
Assistant Prof. of Microbiology
Faculty of Science
Menoufiya University

2002

Approved
M. F. Bayoumi
9/1/2003

لجنة التحكيم
١- ا.د/ محمد ابراهيم المرعى
٢- ا.د/ احمد حسين حشاد
٣- ا.د/ عبد الرزاق عبد الرحمن ابو سعده
٤- د/ محمد على عفيفى

ACKNOWLEDGEMENTS

I am indebted to my supervisor Dr. Mohamed Ali Hefnawy, assistance professor of Microbiology and acting head of Botany Department, faculty of Science, Menoufia University for planing the work, the guidance, support the help he has given during his supervision of this work, and also for writing the manuscript.

I sincerely appreciate the supervision of professor A. H. Hashad, professor of Geochemistry, Nuclear Materials Authority and professor E. M. Hussein, professor of nuclear ores, Nuclear Materials Authority for their guidance, support, encouragement and advice throughout this work,.

Many thanks are due to the Nuclear Materials Authority for logistic and financial support of this work.

I, also wish to thank my colleagues in the Nuclear Materials Authority for their help and encouragement.

I thank my mother for her help and kind care and support during this work.

Many thanks are also due to my husband for his help, encouragement and support during my study and also to my sons, Amr and Omar and my daughter Arwa.

Dedicate this thesis to my parents

ABSTRACT

Seven fungal species were isolated from two uranium ore samples taken from the Alloga region, South Western Sinai, Egypt. They were identified as *Aspergillus flavus, Penicillium brevicompactum, P. oxalicum, P. purpurescens, P. lividum, A. terreus and P. spinulosum.* They were tested for their bioleaching activity of uranium from the studied ore materials. *A. terreus* and *P. spinulosum* showed a high leaching activity . The amount of uranium solubilized by *A.terreus* and *P. spinulosum* was increased with increasing the ore concentration in the growth media, reaching its maximum value at 4% (w/v) of the ore. Whereas, the highest percentage of uranium released by both fungi was obtained at 1% (w/v). At this concentration, the released uranium by *A. terrues* and *P. spinulosum* was 75 and 81.5 % for the ore OS_1 respectively, and 72.8 and 77.6% for OS_2 respectively. The best leaching occured when the final pH was shifted toward acidity. Biosorption of the released uranium by the fungal mycelium was also increased with increasing ore concentration in the growth media.

A. terreus and P. spinulosum secreted some organic acids such as ascorbic, nicotinic, malonic and citric acids. The amount of these organic acids decreased with increasing the ore concentrations. Oxalic acid was secreted only by *A. terreus* at an OS_1 1% concentration of ore.

The optimum parameters for uranium solubilization by the two fungi were 30°C, 6 days of incubation, pH 4, sucrose as carbon the source, NH_4Cl as the nitrogen source, 0.2 mm particle size and 1% ore concentration . The application of all of these optimum conditions for uranium solubilization by *A. terreus* and *P. spinulosum* was studied. *A. terreus* solubilized approximately 88.8 and 77.2% of the uranium found

in ores OS_1 and OS_2 respectively .Whereas, *P. spinulosum* showed higher solubilization, being 93.8 and 84.4% of the uranium found in OS_1 and OS_2 respectively.

Solubilization of metal oxides in the growth media by *A.terreus* and *P. spinulosum* increased with increasing ore concentrations. These metals are Si, Al, Mg, Mn and Na. Whereas, Fe ions solubilization decreased with increasing ore concentration.

A. terreus and *P. spinulosum* secreted some proteins in the culture filtrate. The amount of these proteins decreased with increasing ore concentrations in the growth media. The highest amount of these proteins were found at the 1% concentration of the ore and might aid in the solubilization process (since this concentration is the best one for solubilization of uranium).

Abiotic leaching of uranium utilizing some organic acids revealed that solubilization of uranium at an ore concentration of 1% was increased with increasing citric acid concentration reaching to 54 and 50% for the ores OS_1 and OS_2 respectively at 8% concentration of this acid, while at 8% concentration of ascorbic acid it reached approximately 34 and 31% from the two ores respectively. It was also observed that the percentage of uranium solubilization by both acids was decreased with increasing ore concentration in the solution.

The obtained results of this microbiological(fungal)leaching study of uranium from Alloga ferruginous siltstone was summarized an economic flowsheet.

CONTENTS