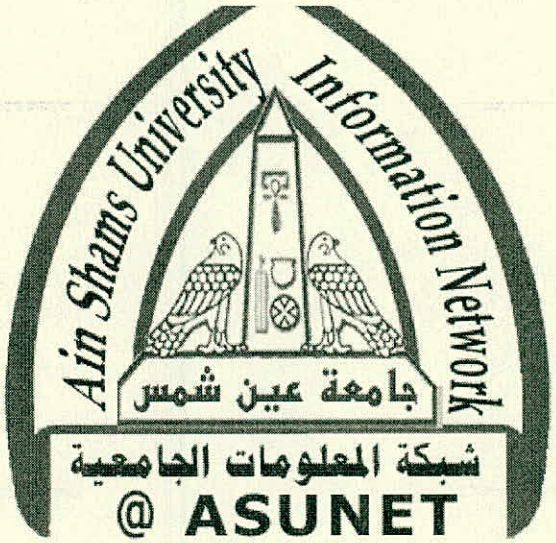
شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

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AIN SHAMS UNIVERSITY
FACULTY OF SCIENCE
PHYSICS DEPARTMENT

Faculty of Science

A THESIS
FOR
M.SC. DEGREE IN PHYSICS

USE OF NEUTRON ACTIVATION ANALYSIS IN THE ASSAY OF NUCLEAR FUEL

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بسم الله الرحمن الرحيم

وعلمك ما لم تكن تعلم

وكان فضل الله عليك عظيما

صدق الله العظيم

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ABSTRACT

A literature review on methods of determination of the uranium contents and enrichment in the nuclear reactor fuel samples is given. Most of the International Atomic Energy Agency (IAEA) reports and several laboratory researches that were interested in that field are covered.

The activation and detection facilities in Laboratory of Neutron Activation Analysis at the Nuclear Physics Department, AEA were used. The laboratory contains 14 MeV neutron generator system of neutron yield 1×10^{11} n/sec and pneumatic system for sample transfer. The neutron flux of the system was measured using Cu-foil activation and aluminum activation techniques.

Uranium samples of different shapes (pellet, powder) and different compounds (UO_2 and U-Nitrate) were assayed using passive and active techniques. Sodium iodide, HPGe detectors and associated electronics were used in the technique of measuring the neutron flux and detection of gamma spectra of the samples. The uranium contents of ^{238}U and enrichment of ^{235}U were determined using the photopeak area of characteristic gamma lines recorded on the multichannel analyzer.

The experimental results were analyzed and compared to the calculated data. Due to the effect of self-absorption of the samples for gamma rays, attenuation corrections were taken into consideration.

CONTENTS

EXPERIMENTAL TECHNIQUE

RESULTS AND DISCUSSION

LIST OF FIGURES