بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

BENEFICIATION OF SOME EGYPTIAN PHOSPHATE ORES BY FLOTATION IN ALKALINE MEDIA

Presented by

Moustafa Youssef Hassan

B.Sc. (Chemistry - 1979)
M.Sc. (Chemistry - 1988)
Assiut University

for the Degree of Ph.D.
(Analytical and Inorganic Chemistry)

Supervised by

Prof.Dr.R.M.Awadallah

Prof. of Anal. and Inorg. Chem. - and
Chairman of Chemistry Department
Faculty of Science - Aswan
South Valley University

Prof. Dr. N.T. El Hazek
President of Nuclear Materials
Corporation - Cairo

Dr. A. E. Mohamed
Assistant Prof. of Anal. Chem.
Faculty of Science - Aswan
South Valley University

To
Chemistry Department
Faculty of Science - Aswan
South Valley University
1996

Acknowledgment

ACKNOWLEDGMENT

The author wishes to express his deepest thanks, gratitudes and grateful appreciation to **Prof. Dr. R.M. Awadallah**, Professor of Analytical and Inorganic Chemistry, the Chairman of Chemistry Department, Faculty of Science at Aswan, the Former Dean of Aswan Faculty of Science and the Former acting Vice President of Assiut University for Aswan Branch, for suggesting the plan of research, the solution, directions, supervision, generous help, keen continuous interest, sincere encouragement, significant discussion and valuable interpretation, and continuous guidance throughout the whole work from the begining untill the appearence of this thesis. Also, the author wishes to thank **Prof. Dr. N.T. El Hazek**, the President of Nuclear Materials Corporation, Cairo and **Dr. A.E. Mohamed**, Assistant Professor of Analytical Chemistry, Chemistry Department, Faculty of Science, Aswan, for their significant encouragement, facilities, and sincere unfailing help.

Prof. Dr. M.A. El Maghraby, the Dean of Aswan Faculty of Science, **Prof. Dr. A.I.M. Koraiem**, Vice Dean for postgraduate and research and the all staff members in Chemistry Department are acknowledged and appreciated for their encouragement.

Deep thanks are due to **Prof. Dr. M.M. Ali**, Head of Analytical Chemistry Department, Nuclear Materials Corporation and **Mr. I.S. Shehata**, Head of mines project sector of Abu Zaabal Fertilisers and Chemicals Co., for their continuous encouragement.

The author would like also to express for his respects and appreciations to **Mr. R.M. Ibrahiem**, the Chariman of Abu Zaabal Fertilisers and Chemicals Co., **Mr. A.F. El Sayed**, Head of mines sectors, **Prof. Dr. T.R**. Boulos, Vice Chairman of Central Metallurgical Research and Development Institute and **Mr. H. El Shaikh**, Head of mines exploration and production sector, **Mr. M.K. Ibrahiam**, General Manager of Mining Equipments for their significant encouragement.

Deep thanks are also due to **Mr. M. Abd El Razek**, General Manager of Survey Department and all staff members of the Department (**Mr. Ashraf, Mr. Abd El Fattah, Mr. Massry and Mr. Issa**) and the analysts (**Mr. Abd El Galil, Mr. Medeni, Mr. Abd El Mohsen, Mr. Moussa, Mr. Ibrahiem, Mr. Abd El Aal and Mr. Ramadan**) for their helps. Sincere thanks are due to **Miss Magda**, Computor processor. Grateful thanks are also due to my Colleagues, Chemists, Geologists, Technicians and Labourers in the Company.

My thanks are also given to every body who helped or encouraged me during this work.

The author

M. Y. Hassan

CONTENTS

CONTENTS

CHAPTER I

CHAPTER II

PAGE

CHAPTER III

CHAPTER I
Introduction

INTRODUCTION, ORIENTATION, PROBLEM, GEOLOGY, AIM OF INVESTIGATION AND LITERATURE

INTRODUCTION

Phosphate rocks are quite abundant in the earth's crust, and occur in a wide variety of diverse origin. More than four-fifths of the world production is derived from deposits of marine sedimentary origin that are of Miocene-Pliocene, Eocene-Upper Cretaceous, Permian and Cambian age. Igneous deposits represent an important source of supply, mainly, in Russia and Common Wealth Republics (the Former USSR), South Africa and Brazil. Distribution of phosphate deposits in the world is located in the attached map (Figure 1).

About 75% of the world productions are produced by four countries; the USA, Russian Union (the Former USSR), Morocco and China, whereas the remaining, 25% are being distributed among 30 countries.

The world phosphate consumption, mainly, in a fertiliser use is about 90%, whereas the 10% remain is of non-fertiliser use(1).

The Egyptian phosphate represents a part of the Mediterranean phosphorite province, which occurs in the south and in the East of Mediterranean Sea, and extends from Morrocco in the West passing through the north African and north-west Asian countries up to Turkey in the east. This phosphorite deposit ranging in age from Upper Cretaceous to Eocene, is of marine sedimentary origin and its deposition seemed to have been controlled by topographic setting of the tethys sea during Cretaceous and early tertiary times.

The Egyptian phosphates had been known since the middle of the last century and they were described by many authors(2).

The phosphate-bearing sediments occur in three main regions which are;

a) The Eastern Desert phosphate region includes El Dakhla & El Kharga Oases, and Abu Tartour area which represent the major phosphate origin. The approximate estimated reserves of phosphate ores reach 700 million tons of 21-23% P_2O_5.

b) The Nile Valley region; in this region the phosphate bearing sediments were traced along the right and left of the Nile from Kom Ombo to Qena and northwards along Wadi Qena up to Gebel Abu Had. The Campanian sediments change gradually from clayey section in the north, to sandy-clayey section at the centre (middle), to sandy section at the south. The phosphate content sharply decreases in the older shallow water and younger deep water sediments. The potential reserves are estimated as 1.7 milliard tons, with 20-22% P_2O_5.

c) The Red Sea phosphate region; this phosphate-bearing region extends as a belt of 10-20 km long from the western shore of the Red Sea and the rocks of basement complex. The phosphate bearing sediments are preserved only in synclinical structures, and in tectonic blocks. The total reserved phosphate deposits in this region are evaluated as 200-250 million tons with 20-22% P_2O_5.

Other occurences of the phosphate-bearing sediments are traced in different areas, but with a limited extent and of no economic value, such as those in Kurkur & Dungula (localities surrounding the High Dam Lake), Wadi Qena, Wadi Araba and Sinai Peninsula.

"As mined" or "run-of-mine", ore consists of valuable metallic minerals and gangue. Mineral processing, sometimes called ore dressing, mineral dressing, or milling, followed by mining and preparation of ore for extraction of the valuable metal in the case of metallic ores, but a commercial end product of nonmetallic minerals and coal are produced. Apart from regulating the size of the ore, it is a physical process of separating the grains of valuable minerals from the gangue minerals, to produce an enriched portion, or concentrate, containing most of the valuable minerals, and a discard, or tailing, containing predominantly the gangue minerals.