شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومـــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

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 %

بالرسالة صفحات

لم ترد بالأصـــل

بعض الوثائق الأصلية تالفة

STUDY OF THE CAPILLARY PRESSURES OF SOME EXPOSED MIOCENE RESERVOIR ROCKS, GULF OF SUEZ, EGYPT

A THESIS

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

By
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(B.Sc., in Geology, 1989, Menoufia University)

To
Geology Department
Faculty of Science
Ain Shams University
2002

To my father's spirit, my mother, my brothers and sisters

Approval Sheet

Name: OSAMA MOHAMED EL SAYED EL NAGGAR

Title: STUDY OF THE CAPILLARY PRESSURES OF SOME EXPOSED MIOCENE RESERVOIR ROCKS, GULF OF SUEZ, EGYPT

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NOTE

The present thesis is submitted to the Faculty of Science, Ain Shams University in partial fulfillment for the requirements of the degree of Master of Science in Geology.

Besides the research work materialized in this thesis, the candidate Osama Mohamed El Sayed El Naggar has attended ten post-graduate courses for one year in the following topics:

1-Field Geology and Statistical Geology.
2-Physical Properties of rocks and Formation Evaluation.
3-Hydrogeology and Hydrodynamics.
4-Sedimentary Petrology and Sedimentation.
5-Lithostratigraphy and Structural Geology.

He has successfully passed the final exam in the above mentioned courses, besides an English language course.

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ABSTRACT

STUDY OF THE CAPILLARY PRESSURES OF SOME EXPOSED MIOCENE RESERVOIRS ROCKS, GULF OF SUEZ, EGYPT

The present study deals with the capillary pressure properties of the Lower Miocene (Rudeis Formation) exposed in the eastern shoulder of the Gulf of Suez (southwestern Sinai). For this aim, two lithostratigraphic sections of the Miocene rocks cropping out along Wadi Feiran and Wadi Baba areas were studied. These are Gebel Hadahid and Wadi Baba sections. The studied area of Gebel Hadahid lies between latitudes 28° 43`, 28° 45` N and longitudes 33° 23`, 33° 25` E with a measured section of 196 meters. Similarly in case of Wadi Baba area it lies at a latitude 28° 57` 18`` N and longitudes 33° 16` 15``, 33° 16` 27`` E with a measured section of 94.75 meters. These sections belong to the Lower Miocene (Rudeis Formation). Thirty three (33) and fourty three (43) representative samples were collected from Gebel Hadahid and Wadi Baba areas, respectively, these samples were subjected to different petrological and petrophysical techniques. The geological and petrological study included particle-size analysis, X-ray diffraction, scanning electron microscopy, acid digest, microfacies analysis. Petrographic and petrogenesis studies were employed. The petrographic study revealed that quartz grains represent the dominant framework grains in Gebel Hadahid section with occurrences of feldspars, rock fragments, fossil fragments, glauconite and chert. These samples suffered from diagenetic processes as cementation, neomorphism, dolomitization, fracturing and compaction. Environment of deposition was fluviomarine. On the other hand petrologic analysis of Wadi Baba section particularly microfacies analysis exhibited non-calcareous grains and calcareous grains (Allochems) as: foraminifera, molluscs, echinoids, bryozoa, algae and spiculites. All the studied carbonates of Wadi Baba section have suffered from different diagenetic processes as neomorphism, cementation and dolomitization.

The petrologic investigation revealed that the depositional environment of Baba section is basinal deep-water with slow sedimentation. On the other side petrophysical analyses included porosity and permeability, electrical properties, capillary pressure and scanning electron microscope techniques. The Petrophysical investigation revealed that The Rudeis Formation could be considered as good to very good reservoir due to its high porosity cut off values which used to determine the net storage capacity. Grain density of Gebel Hadahid samples is lower than that of Wadi Baba samples because the type of sediments is mainly sandstones in Hadahid but limestones in Baba. Concerning permeability the flow characteristic is good in Gebel Hadahid than that of Wadi Baba so the Rudeis Formation could be considered as a reservoir in Gebel Hadahid and as a cap rock in Wadi Baba area. Gebel Hadahid samples revealed higher range of permeability than that of Wadi Baba samples. Electrical resistivity measurements revealed that the calculated cementation exponent increased gradually as the overburden pressure increased when the multiplier (a) of the general equation ($F = a.\phi^{-m}$) equal to the unity (Archie's type). Also it is found that both Wyllies's multiplier (a) and cementation exponent (m) generally increased as the applied overburden increased for Gebel Hadahid and Wadi Baba samples respectively. It was found that variation range of cementation exponent with pressure in case of Archie is more wider than that of Wyllie's range. Robust empirical charts among depths, overburden pressures, cementation exponents, multipliers, porosity and formation resistivity factors have been constructed to be applicable for subsurface occurrence of the Rudeis Formation sediments in the nearby areas. Results of the capillary pressure confirmed that Gebel Hadahid samples have higher mean pore throat than those of Wadi Baba, and this reflects the high permeability and recovery efficiency values for the Gebel Hadahid samples than those of Wadi Baba. SEM technique was used for some samples to show the pore geometry which affects the petrophysical parameters.