deposition of calcium carbonate - travertine. Formed from travetrine dome it has brown color due to the oxidation of high iron content in this section.

Also radon measurements were conducted in the sources. The concentration of radon in water springs varies widely from 1 to 155 eman/dm^3. Enrichment of water with radon is apparently due to the leaching of trace radioactive elements from the intrusive body [2].

Medicinal properties of water are determined by mineralization, high temperature and content of carbon dioxide, as well as radon and other biologically active components.

Thus, according to GOST R 54316-2011 groundwater natural complex "Choigan" can be attributed to low-mineralized drinking water treatment – dining, weak carbonic waters, low and medium radon [4]. It is necessary to conduct comprehensive studies of unique natural sources because of its hydro-geochemical and medical character in connection with people's natural treatment.

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GEOTECHNICAL APPRAISAL OF THE SOILS IN EAST ASWAN CITY, EGYPT

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Geotechnical properties of the soils were investigated to evaluate their geotechnical behavior. Unconfined compressive strength was ranging from 1.86 to 31.7 Mpa. Grain size analysis showed that the effective diameter ranging from 0.1 to 0.2 mm and the uniformity coefficient C_u ranging from 5 to 15.5. The results of specific gravity showed that the values ranging from 1.87 to 2.2 g/cm^3. Free swelling percent was ranging from 50 to 62 %. Shear characteristics had slightly difference values were ranging from 18°-25° and shear strength from 5.2 to 9 Mpa and the free swelling percent ranging from 50 to 62 %.

The main objective of the present study is the answer to the following questions: what rocks and soils are present, and how are they distributed under the site, the geotechnical properties of these soils, the chemical composition of groundwater along the study area and the effect of these composition on the soil to construct bumping water station in East Aswan city (Fig.).

The study area consists of metamorphic and igneous rocks of Precambrian age, sandstone and clay of the Nubian Sandstone series of Upper Cretaceous age and ancient gravels, sands, river sands and Nile mud of Pleistocene and Recent ages [7, 8].

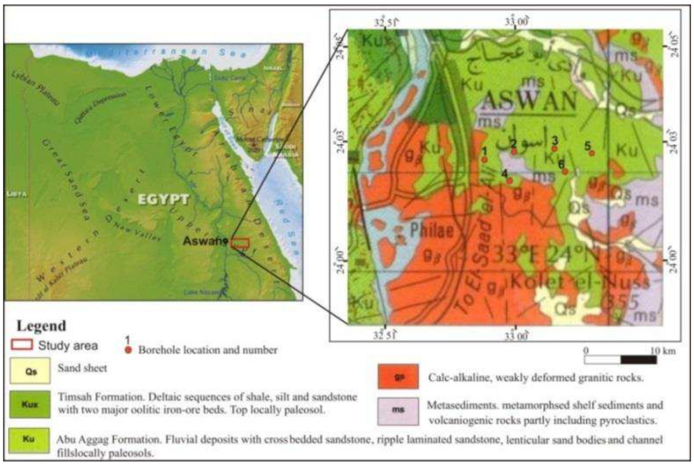

Fig. Surface geological map of the study area (modified after CONCO 1987)

Six boreholes were carried out to study the properties and thickness of different soils along the study area. The methodological approach used for the investigation and analysis of the geotechnical properties of the soils, five geotechnical tests including grain size analysis, specific gravity [3], unconfined compressive strength, shear strength [4] and free swelling test [6] were conducted on the studied soils along the study area. Chemical analysis was carried out for groundwater [1] along the study area.

Grain size distribution of the collected samples were performed according to [2], the results were shown that these sands classified as medium to coarse sands where effective diameter for the soil samples was ranging from 0.1 to 0.2 mm and the uniformity coefficient C_u was ranging from 5 to 15.5.

Specific gravity test results showed that the investigated samples of the soils had slightly different values of specific gravity [3]. Specific gravity values of the studied samples were ranging from 1.87 to 2.2 g/cm^3 (Table 1).

Unconfined compressive strength values according to [4] friable clay had the lowest average value ranging from 1.86 to 8.27 Mpa, for clayey sandstone 25.1Mpa, silty clay had the average value 18 Mpa and medium to coarse sandstone had the highest value 31.7 Mpa (Table 1).

Direct shear tests were conducted to investigate the shear strength characteristics of the soils, the fine grained soils (friable clay) had a peak friction angle of about 18° while the medium to coarse grained sandstone had a peak friction angle about 25°. This difference in peak friction angle is likely to be due to the grading and the proportion of swelling clay minerals, the peak strength and the friction angle of the clays decreasing with increasing amounts of swelling clay minerals and decreasing grain size (Table 1).

The free swell test is a qualitative indicator of expansive soils. Free swell test were conducted to investigate the swelling of the clays according to [6]. It can be seen that the swelling percent ranges between 50 to 62 %, this mean that these soils are moderately swelling soils.

Table 1

Geotechnical properties of the soils at the study area

Soil Types	Specific Gravity, g/cm^3	Uniaxial Compressive Strength, Mpa	Effective friction angle, Φ $^\circ$	Shear Strength Mpa	Effective Cohesion, C Mpa	Swelling Percent, %
Friable Clay	2.2	1.86	18	5.2	3.3	62
Clayey Sandstone	2.08	25.1	22	6.7	3.5	59
Clay	1.8	8.27	22.8	7	4.2	60
Medium to Coarse Sandstone	1.87	31.7	25	8	5.3	50
Silty Clay	2.0	18	19	9	4	62

Chemical analysis for groundwater was performed on 6 water samples. Samples were analyzed at the laboratory according to the standard analytical procedures according to [1]. The results were conducted as shown in the Table 2 according to [9] and [10] the groundwater in the soils along the study area was slightly aggressive on the soil.

Table 2

Chemical composition of groundwater at the study area

TDS, ppm	Cl^- mg/l	SO_4^{2-}	pH	Conductivity
1000	350	20	7.4	26

Analysis and interpretation of the laboratory results and the field observations led to the following findings:

- Grain size distribution of the collected sand samples from the boreholes were generally medium to coarse grains and poorly graded sand and these sands not qualified to use in any construction projects.
- The investigated soil samples had slightly different specific gravity values were ranging from 1.87 to 2.2 g/cm^3 and this may be according to the mineral composition.
- Unconfined compressive strength values of the soil samples had wide range of variability, where the lowest value for friable clays 1.86 Mpa and the highest value 31.7 Mpa for medium to coarse sandstone.
- Shear characteristics of the soils were ranging from 18°, in the fine grained soils (friable clay) to 25°, in the medium to coarse grained sandstones. The peak strength and the friction angle of the clays decreasing with increasing amounts of swelling clay minerals and decreasing grain size.
- The investigated soil samples had the free swelling percent ranging from 50 to 62 %, for this we must try to prevent occur any seepage of water in these soils.
- Groundwater in the soils along the study area was slightly aggressive on the soil.

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INVESTIGATION OF TECHNOLOGICAL PARAMETERS INFLUENCE ON THE CATALYTIC DEWAXING PROCESS USING DEVELOPED MATHEMATICAL MODEL

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The problem of efficiency upgrading of the operating installation is defined by determination of technological conditions in many instances. Catalytic dewaxing process finds the increasing application in domestic enterprises. There are different technologies of this process implementation. For instance, technological scheme in independent mode operating, hydrofining process along with dewaxing in single-unit, series-connected reactors of dewaxing and hydrofining in the different sequences with using different catalyst combination mixtures and other [2].

Solving the problem of technological parameters optimization is possible by the development a computer modelling system of diesel fuel production which will be focused on physical and chemical mechanisms of the hydrodewaxing process reactions.

The mathematical model of disel fuel hydrodewaxing process was developed during the research. For the estimation thermodynamic properties of hydrocarbons, participated in the chemical transformations, quantum-chemical methods, realized in program Gaussian, were used. The method of calculation is DFT – Density Functional Theory, theoretical approximation is model B3LYP, basis 3-21G. As a result of the thermodynamic analysis, hydrocarbons conversion scheme was developed. At the base of conversion scheme the kinetic model of the dewaxing process was made [1].

Using developed computer modelling system the technological parameters influence on the main reactions of hydrodewaxing process can be carried out.

Therefore the aim of present work is to evaluate of temperature and hydrogenous gas feed influences on the hydrodewaxing process reactions using developed computer modelling system.

Technological scheme of this process includes three series-connected reactors, the first and the second reactors are intended for hydrofining and the third reactor is intended for hydrodewaxing of diesel fuel. In the first and second reactor NiO – MoO_3 catalyst is used. In the third reactor – CoO-MoO_3 catalyst is used. Raw materials of dewaxing process is: visbreaking gasoline, middle distillates, atmospheric gas oil. Also hydrogenous gas feeds in the reactors. The result of receiving is diesel fractions, gasoline and petroleum gas production (Fig.1).

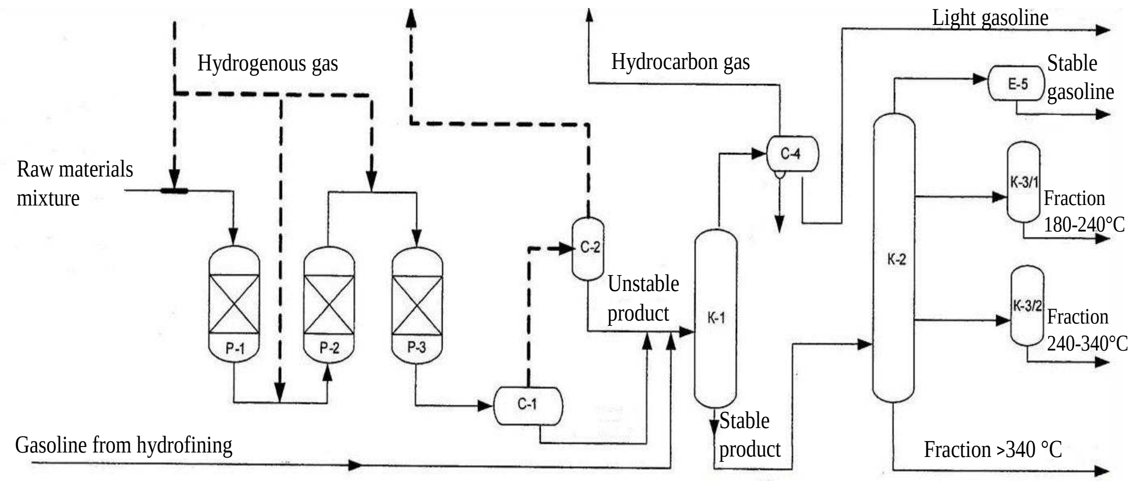

Fig. 1 Technological scheme of catalytic dewaxing process

The process of catalytic hydrodewaxing is based on the two main reactions: hydrocracking of high molecular weight linear paraffins C_{10}–C_{27} and isomerization of normal paraffins in order to improve products low temperature properties. Also, hydrogenation of aromatic, polyaromatic, olefinic hydrocarbons and cyclization of i-paraffins occurs in the third reactor [3].

Hydrocracking of normal paraffins occurs with formation of decomposition products such as i-paraffins and n-paraffins lower molecular weight. And as higher molecular weight of the n-paraffins, then deeper are their conversion.

Isomerization of n-paraffins occurs with the formation of paraffins, naphthenes through an intermediate stage of dehydrogenation of n-paraffins with the formation of olefins in the reactor.