



Geotechnical evaluation and the extent of the validity of the clayey rocks of Injana Formation (upper Miocene) in Al-Najaf, Al-Ashrif Governorate for the purposes of construction industry bricks

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Abstract : The research studied claystone of Injana Formation (upper Miocene) in the Najaf governorate in middle of Iraq, (ten) stations were taken and the search included several aspects field, laboratory, and office aspects In the field work information about the region were gathered and the stations were described and model work to conduct the required tests and laboratory analyses. The laboratory work included the geotechnical tests to evaluate the physical, engineering, chemical and mineralogical properties of claystone and determine its suitability the mud brick used in the construction industry.

Physical tests showed that the percentage of clay is ranging from (50.2-83.9) and the percentage of silt is between (15.9-40.9) and while the sand is between (0-8%), the liquid limit ranges between (31-65), and the plastic limit between (17 -32), while the plastic index between (12-38), The Shrinkage limit between (20-41), and the Rieke index between (3-9), The results of the liquid limit and plastic index that of the upper indicate the soil classification while, based on the Unified Soil Classification System (USCS), is type (CH) the clays high plasticity, and the lower layers are of the type (CL) and low Clays plasticity, The bulk density ranging from (1.8 to 1.2) gm / cm³ and the specific gravity is between (2.7-2.81), while porosity value are between (31.91-47.89%), and that the cohesion values are between (25-70), while the values of internal friction angle are between (9° -37.5°).

The results of the chemical analysis that showed the silicate content is the highest, followed by the, calcium, aluminum, iron, magnesium, potassium, and sodium oxide sulfates. The X-rays diffraction (XRD) test showed the non-clay minerals, quartz, calcite, and feldspar, are dominant while minerals Montmorillonite, Illite and kaolinite are the dominant in the clay minerals.

The Claystone of Injana formation for the purposes of brick construction industry is evaluated by Adding by (10&15%) of sand, while the percentage the husk of rice added is (5&2.5%) in order to manufacture bricks with the best specifications in the physical, engineering and chemical properties (600) samples were prepared by using the semi-dry press method and heating, are temperatures (850°&1050°) in accordance with the burning program that includes raising the temperature (5c°/ min) and three hours soaking time. The results showed a significant improvement of the samples when (10%) of sand and (2.5%) from the husks rice and added in terms of water absorption and uniaxial compressive strength and efflorescence (A) and type A is obtained when it is compared with the Iraqi standard (25 of 1993) and the American standard (C62-10 2010).

The study recommends estimating the reserves of claystone in the Injana formation and the economic evaluate of clays, and its show suitability as Quarries and the establishment of factories for the purposes of ceramic industries.

Keywords : Geotechnical Evaluation, Claystone, Injana Formation, Bricks.