ASSESSMENT OF SOME CLAY DEPOSITS FROM THE GERCUS FORMATION (MIDDLE EOCENE) FOR BRICK MANUFACTURING IN THE DOKAN AREA, NE IRAQ

Rezan Q. Faraj

Geology Department, College of Science, Sulaimania University, Sulaimani, Iraq
Correspondence e-mail: rezan.faraj@univsul.edu.iq

Type of the Paper: Article
Received: 31/50/2023
Accepted: 16/08/2023

Keywords: Clay; Clay Ceramic; Atterberg Limit; Physical Properties; X-Ray Diffraction.

ABSTRACT
The objective of this research is to evaluate the suitability of some clay deposits from the Gercus Formation (Middle Eocene) in the Dokan area, Northeastern Iraq for brick manufacturing. Physical properties of the raw material including grain size analysis and Atterberg limits showed that composed mostly of sand and silt with a minor proportion of clay and classified as muddy sand. According to the plasticity chart, the studied sample plotted on the field of silt and organic clay with low plasticity. The geochemical analysis by X-ray fluorescence revealed that composed of a low percentage of silica and alumina and a high percentage of calcium oxide and magnesium oxide. The mineralogical analysis by X-ray diffraction showed that the studied samples were composed of non-clay minerals (dolomite, quartz, hematite, albite, anatase, and orthoclase) and clay mineral (montmorillonite, kaolinite, and illite). Twelve ceramic briquettes were prepared from the clay sample by semi-dry pressing method and pressed by 200 kg/cm² pressure with 14 – 15 % moisture content and fired at 880, 900, and 920 °C for evaluation tests of linear firing shrinkage, apparent porosity, water absorption, bulk density, efflorescence, and compressive strength. Results of physical and mechanical properties of the studied ceramic briquettes compared with the specification of Iraqi standard (1993) for clay brick manufacture, according to this specification the studied sample was not suitable for brick manufacturing due to a high percentage of water absorption and low compressive strength.

1. INTRODUCTION
Ceramics is an inorganic, non-metallic material that is consolidated by firing at high temperatures (Ryan, 1978). Clay is used in the ceramics industry because its versatility allows it to be effectively cast into any shape and gives hardness and quality to the ceramic body after firing. The reaction of clay with other minerals during firing including silica, and other fluxes, such as feldspar, are responsible for the final product properties (Kingery, 1967). The researchers have studied clay deposits in Iraq for the ceramic industry. Lateef (1976) evaluated the claystone sediments of the Neogene age for the Foothill Zone of the Hamrin range, which are essentially consistent with a 20% – 50% clastic sedimentary sequence. Merza (1997) evaluated some Late Cretaceous to Tertiary clay deposits in northeastern Iraq for ceramic tile manufacture. Al-hakim (1998) investigated some clay deposits from the