

Mineral, Chemical Composition and Firing temperature degree determination of two Pottery vessels – Return to Pre-dynastic period - Helwan cemetery- Egypt

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Abstract:

This research deals with the study of the mineral and chemical composition and determination of firing temperature degree of two pottery vessels - the pre-dynastic era - Helwan cemetery. Helwan was one of the areas that witnessed early civilizational activity from the ancient Stone Age until the end of the ancient era in Egypt. Helwan civilization considered one of the Neolithic civilizations. In addition, is located in the Cairo governorate between present-day Helwan and the end of the Wadi Houf or its mouth. Two pottery vessels - the pre-dynastic era - Helwan cemetery in Cairo governorate was studied, examined and analyzed by various means, including: Visual Investigation - Digital Optical Light Microscope USB - Polarizing Light Microscope - X-ray diffraction analysis XRD - Differential Thermal Analysis (DTA). The examination and analysis processes considered among the important stages in the field of archaeological studies in general and pottery in particular, as they are the basis of restoration processes, through which we obtain historical data and information about the antiquity and its manufacturing techniques. The artifact can also return back to the historical period in which it was made through mineral, chemical and thermal analyzes to complete the objectives of the study. It goes back to the Archaic Era - the era of the First Dynasty and confirmed by the results of the Australian mission excavations. Mineral changes, which contribute to better treatment and maintenance steps. The various methods of examination and analysis showed very good results, as they showed the mineral and chemical composition of the ancient pottery vessels, which the restorers must know well in any of the different sites before they carry out the restoration work. Where it showed the presence of Quartz SiO_2 , Gehlnite $\text{Ca}_2\text{Al}_2\text{SiO}_7$, Diopside $\text{MgCaSi}_2\text{O}_6$, and Wollastonite Ca_5SiO_3 , in addition to Calcite CaCO_3 – Hematite Fe_2O_3 – Halite NaCl with different proportions for each sample, according to the type of clay, its chemical and mineral composition, and the conditions of burning and burial.

Key Words:

Mineral and chemical composition, Firing temperature, Gehlnite, Diopside, Wollastonite.