

The new monumental gate excavated in Tol-e Ajori (Fars, Iran): investigations on technology of bricks production and clay raw materials provenance

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This work deals with the characterization of the bricks, which belong to Tol-e Ajori Gate: one of the most important excavation in Persian plateau, closed to the World Cultural Heritage of Persepolis. The archaeological excavations of Tol-e Ajori (Fars, Iran) were carried out between 2011 and 2015 and a building structure came to the light. The wall structure is built with mud-bricks and fired bricks, some of which are glazed. In the outer face of the walls and in the collapse, decorated materials and glazed bricks were found showing parts of figurative motifs in reliefs. They are very similar to the bricks from Babylon's Ishtar Gate, although the colours are paler without the typical blue background of this gate.

A series of representative bricks from the found materials were selected for archaeometric analyses.

Several investigations were carried out in order to clarify firstly the compositions and the technology of the bricks production. A further goal of the present study was to compare the bricks composition with local clays data to determine a possible provenance [1]. Some clay deposits outcropping in the neighbourhood were recognised and clay samples were collected in order to possibly identify the raw materials used for the bricks material production.

Brick samples were investigated using different analytical techniques (Optical Microscopy, SEM/ESEM-EDX, FT-IR/ATR, XRD, XRF, TGA, STA and Micro-Raman) to point out differences in chemical and mineralogical composition. The clay raw materials have been submitted to XRD, XRF, SEM-EDX and FTIR-ATR analyses. In order to discriminate clays groups PCA and HCA were also performed on the chemical compositional data.

A wide homogeneity was present for all the considered bricks: Ca-rich clays with quartz-rich temper were used, this possibly suggesting a common origin. Firing temperatures were supposed on the basis of the presence of newly formed crystalline phases [2].

[1] Tite, M. S., 2008, Ceramic Production, Provenance and Use—a Review. *Archaeometry* 50(2):216-231.

[2] Cultrone, G., Rodriguez-Navarro, C., Sebastian, E., Cazalla, O. & De La Torre, M.J. 2001. Carbonate and silicate phase reactions during ceramic firing. *European Journal of Mineralogy* 13: 621-634.