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Rockmagnetic study of firing temperatures of ceramics from Iron age settlement in Bulgaria

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Magnetic properties of fired archaeological pottery fragments may provide essential information about the firing atmosphere during pot preparation and utilization due to high redox sensitivity of the iron oxides formed in different conditions. Additionally, recently proposed method for determination of maximum firing temperatures of ceramics is based on the behavior of magnetic susceptibility during step-wise reheating to increasingly high temperature and offers high sensitivity and precision. In this study, a collection of 41 ceramic shards from archaeological site located in the Rhodopes mountain is studied. Archaeological levels from which ceramic fragments were taken date to the Early and Late Iron age in Bulgaria. According to the archaeological information, 20 samples come from tableware and 20 samples from kitchenware ceramics and one sample – from a big storage pot. Magnetic susceptibility reheating method is applied on the collection in order to determine the firing temperatures of the fragments. The behavior of the first derivative of susceptibility squared is used for exact determination of the firing temperature. The experimental data are characterized by systematic presence of two maxima in two different temperature intervals. The lower one varies in a wide range, while the second one appears in a narrow interval between 720 deg.C and 780 deg.C. Taking into account the uniform type of the initial clay used for the production of the ceramics, we suggest that firing temperatures are reflected by the first peak of the first derivative of the magnetic susceptibility squared, which vary between 400 deg.C and 640 deg.C. The lowest are the firing temperatures obtained for the pots prepared using fast pottery wheel and belonging to the most recent stratigraphic levels. Moving towards older levels, a progressive increase in the firing temperature is observed, which suggests a change in the ancient firing technology. Besides, analysis of magnetic data allows separation of pots from the kitchenware which suffered secondary reheating during their use for cooking purposes. This study is supported by the project DFNI K02/13 funded by the Bulgarian National Science Fund.