

A non-destructive method for the identification of VOCs in ancient Cypriot pottery: A preliminary case study

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Abstract

In this work, a non-destructive method was developed and applied to identify volatile organic compounds (VOCs) emitted from ancient pottery. The purpose of the work was to identify compounds that can be used as indicators to comprehend the use of ancient ceramics. For this purpose, 4 prehistoric vessels (3 juglets and a small amphora), which were recently (2020) excavated by the Department of Antiquities from tombs at the archaeological site of Alambra-Kato Lakkos (Nicosia) were measured at the premises of the Cyprus Museum, in Nicosia. Special custom made glass containers were prepared to place the objects and to properly sample emitted VOCs after they had previously been equilibrated for a certain period of time (24 and 72 hours). The objects were then processed according to established archaeological protocols, and then both the "clean" vessels and their contents (soil) were measured again.

The sampling of emitted VOCs was performed inside the museum. The VOCs were collected on Tenax TA hydrophobic sorbent tubes at a flow rate of 0.1 L min⁻¹ for 10 min with the use of ACTI-VOC low-flow pump (Markes International Ltd, UK). The chromatographic analysis was accomplished using a TD system coupled with gas chromatography (Agilent GC-7890 B, Agilent Technologies Inc, USA) and mass spectrometry (Agilent MS-5977 B, Agilent Technologies Inc, USA).

A total of 94 volatile organic compounds (VOCs) were detected; 78 VOCs before their cleaning treatment, 43 after the cleaning treatment, and 31 VOCs in the contained soil. Benzoic acid was probably the most important compound detected. Considering the shape, size, and recovery context of the analysed vessels,

a substance such as aromatic resin could be contained in these vessels. More experiments should be carried out to draw safer results.

References

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