

Abstract

Eight painting samples excavated from various archaeological sites in Spain were donated by the Archaeological Museum of Catalunya for analysis. These samples were believed to be encaustic based on observations of their physical properties and the time period they are estimated to be from.

First, it was desired to determine the composition of the paint and whether it was encaustic by testing for the presence of beeswax in the paint and metals. Characterization of two types of beeswax allowed for identification of five key components which would be used to determine the presence of wax in the paint samples. The composition each of the eight painting samples was characterized using Fourier transform infrared spectroscopy (FT-IR) to determine the functional groups present, atomic absorption spectroscopy (AAS) to determine the concentration of potassium and calcium, and gas chromatography-mass spectrometry (GC - MS) to identify the specific compounds.

Each of the eight samples showed similar evidence of hydrocarbons and carboxylic acids in its IR analysis, however only five of them showed the presence of the key components of beeswax. Additionally, two of the samples had inconclusive results, possibly due to the relatively small abundance of the desired compounds.

The presence of beeswax in the samples strongly indicates that they were painted using the encaustic technique. Another piece of evidence which would confirm that these paintings are authentic encaustic is verification of their age. Carbon dating showed inconclusive results, possibly due to the small amount of carbon in the sample.

The composition of a modern encaustic paint was compared with that of the samples submitted for analysis to determine whether the modern formula and preparation technique similarities with the one used in ancient times. FT-IR analysis showed similar components present in the two types of paint, but analysis by GC-MS did not show any conclusive evidence of compounds present in both besides those present in beeswax.