

INTEGRATED MASS SPECTROMETRY APPROACH FOR THE CHEMICAL CHARACTERIZATION OF ORIGINAL PAINT TUBES USED BY EDVARD MUNCH

J. La Nasa, M. Zanaboni, I. Degano, F. Modugno, M.P. Colombini

¹ Dipartimento di Chimica e Chimica Industriale, Università di Pisa, Via Risorgimento 35
– 56126 Pisa, jacopo.lanasa@for.unipi.it

A multi-analytical approach based on different mass spectrometric analytical techniques was used for the analysis of the content of seven paint tubes from the study of Edvard Munch (1863- 1944), Norway's most famous painter and front figure in modernism.

The Munch Museum in Oslo and the Museum of Cultural History of the have established a project to investigate the paint tubes and catalogue them. In the framework of this project, we used GC/MS and HPLC-ESI-Q-ToF to study the composition of the organic binding media of the studio materials, paint tubes by two producers, Winsor & Newton and Richard Wurm, in variable state of conservation. Samples were provided by Hartmut Kutzke from University of Oslo.

We aimed at improving the knowledge of the first industrial paint materials used by artists in the late nineteenth century and the first half of the twentieth century, in correspondence to the introduction and the diffusion of commercial oil paint tubes.

In particular, GC/MS analysis after hydrolysis, extraction and silylation allowed us to identify the fatty acid profile of the paint materials (Figure 1) and to study the molecular changes associated to curing and ageing.

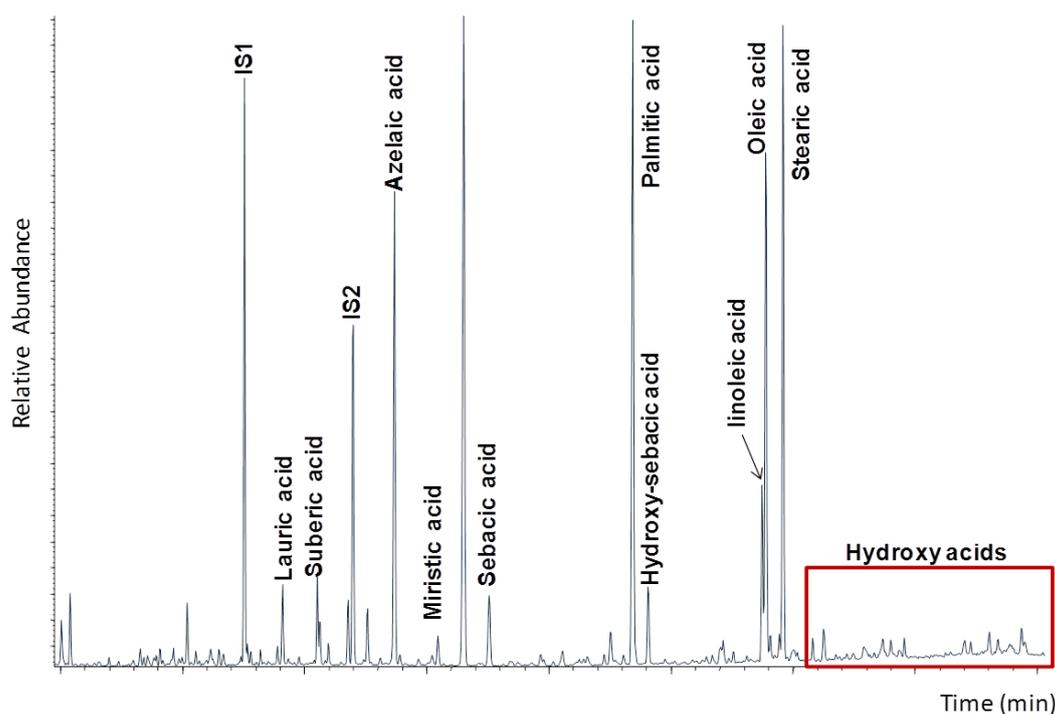


Fig. 1. GC/MS chromatogram of the paint material contained in Winsor & Newton paint tube from Munch's studio (Munch Museum in Oslo)

GC/MS analysis shows the presence of a lipid binder in all the samples. The abundance of azelaic acid and of other dicarboxylic acids points out that the lipid material is an oxidized drying oil.

(RP)HPLC-ESI-Q-ToF using positive ionization mode and tandem mass spectrometry was used to determine the distribution of triglycerides (TAGs). The profiling of triglycerides and diglycerides after extraction with a chloroform/hexane mixture (3:2) [1] permitted to determine the raw materials used in the production of the paint and to highlight important differences between tubes from different producers.

The obtained data will be exploited to better understand Edvard Munch's painting technique. They will also contribute to address dating, authenticity and conservation issues by comparison with the results of analysis of samples from paintings.

References

J. La Nasa, E. Ghelardi, I. Degano, F. Modugno, M.P. Colombini, *Journal of Chromatography A*, 1308 (2013) 114-124