

ARCHAEOLOGICAL EXPERIMENTATION OF IBERIAN IRON-GALL INK RECIPES FROM THE 15TH –
17TH CENTURY

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Abstract (max 500 words including references)

In Europe, iron gall ink recipes are profusely described in medieval treatises that mention the use of plant extracts such as *Quercus infectoria* that were combined with iron salts [1]. The result of this mixture was an iron-polyphenol complex, to which a polysaccharide such as arabic gum was usually added [2]. In this poster, five historical inks studied were selected based on research into Iberian written sources of medieval techniques and the characterization results are supported by comparison with several iron complexes; as precipitates or prepared as inks by adding gum arabic.

Four Spanish and one Portuguese ink recipe, dated between 15th-17th centuries, were chosen and are representative of different institutions in which the use of the writing ink was essential, such as universities, notaries, chanceries and the monastic world. A study of the documentary sources and their rational interpretation has been carried out, for the reproduction of the recipes in the laboratory with as much accuracy as possible [3].

A series of analyzes has been carried out with the objective of characterizing the inks, making it possible to build bridges between disciplines such as History / History of Art and Chemistry. Colorimetry has shown that all inks, because of their color, are suitable for writing, which have the characteristic black color intended. The molecular analysis has allowed to understand the variability between the inks, in particular the distribution of polyphenols (commonly called "tannins"). HPLC-MS-DAD has shown that in the galls extracts, the gallic acid is not be a major component, relatively to the polygalloyl esters of the carbohydrates, such as penta or digalloyl-glucose. Finally, the characterization by Raman and infrared allowed to identify these inks, at a molecular level, as an iron-gall ink, as it is described in literature.

Historically accurate reconstructions of medieval inks were crucial to bringing new insights into iron gall inks complex structure and compounds formed within it, which will advance future preparations of model inks and new conservation treatments [3].

More than iron-based inks, we can begin describing these inks as highly specific, iron-polyphenolic formulations.

References: (reference citations in the text should be identified by numbers in square brackets)

[1] Neevel H. In: Kolar J, Strlič M, editors. Ljubljana: National and University Library; 2006. p. 147-172.

[2] Zerdoun-Bat Yehounda M. Paris: CNRS Éditions; 2003.

[3] Díaz Hidalgo RJ, *et al.* Herit Sci. *submitted*.