

# OXIDATION-CORROSION (OF IRON GALL INKS)

## Mostra

Edict of Jaime Miguel de Guzmán. University of Barcelona. Spain. Laid paper, 100% rags.

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## Causes de la patologia

The iron gall ink corrosion is due to the acid composition and chemical instability of its main components: gallnuts extract (tannin) and vitriol (iron (II) sulphate).

The natural oxidation of the gall ink produces the decomposition of the molecule and the formation of ferric sulphate. The hydrolysis of ferric sulphate produces acid sulphuric and ferric oxide. Ferric oxide cause the colour change and discoloration of the gall ink and acts as transport and catalyst for hydroxyl radicals (Felton mechanism), oxidizing the cellulose and producing carbonyl and carboxyl groups. Sulphuric acid, migrating by capillarity, starts to oxidize the cellulose, causing the colour change of the paper. The acid compound also favours the hydrolytic splitting of the cellulose, producing the transformation of cellulose into sugar and therefore, the loss of support in the ink areas.

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## Imatge de visu

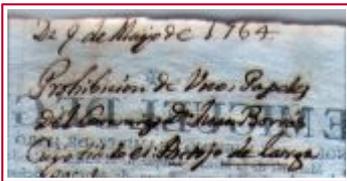


**Autor:** Diana C. Mas Domínguez

**Descripció:** Handwriting with iron gall ink. Located on the reverse of the document, at the top centre.

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## Imatge detall / macro



**Autor:** Diana C. Mas Domínguez

**Augments:** Scale

**Descripció:** Visible change of ink color, especially at the edges of the stroke, although its opacity is increasing. Visible discoloration of paper areas besides and underneath the ink.

Figure 1. Visible change of ink color, especially at the edges of the stroke, although its opacity is increasing. Visible discoloration of paper areas besides and underneath the ink.

Figure 2. The ink has stroked-through the support, being visible on the obverse of the document.

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## Patologies associades

Acidity.  
Discoloration.  
Halo.  
Oxidation.

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### **Observacions**

The reactions between ink and support materials are strongly influenced by environmental and storage conditions, especially temperature and humidity. Also influence the dimensioning and the inorganic fillers and coating used in papermaking.

File author: Diana Celeste Mas Domínguez.

Subject: Examen, Diagnóstico y Documentación II.

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### **Bibliografia**

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DANIELS, V. (2000). The chemistry of iron gall ink. "The Iron Gall Ink Meeting" 4th & 5th September 2000. The University of Northumbria. Newcastle.

VV.AA (2011). The Iron Gall Ink Website. December 17, 2012 <http://ink-corrosion.org/>>.

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### **Autor**

Secció Conservació-Restauració. Facultat Belles Arts. [ub.conservacio.restauracio@gmail.com](mailto:ub.conservacio.restauracio@gmail.com)  
Education

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### **Institució o Empresa**

Universitat de Barcelona

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