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Protective effect of linseed oil varnish on archaeological wood treated with alum

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Abstract

The Viking Age wooden artefacts recovered in the early 1900s from the Oseberg mound (Norway) and treated with alum, are today highly degraded. This is due to the effects of the alum-treatment and the reactivity of alum and alum-derived salts [1]. Some of the artefacts from the Oseberg collection that were treated with alum were also coated with a drying oil: boiled linseed oil. These artefacts appear to be better preserved with respect to those not treated with linseed oil.

In order to assess the effect of linseed oil on wood preservation, an alum-treated archaeological wood fragment from the Oseberg collection treated with linseed oil was investigated by three analytical techniques: gas chromatography coupled with mass spectrometry (GC/MS), pyrolysis-gas chromatography/mass spectrometry (Py-GC/MS) and high-performance liquid chromatography coupled to electrospray ionisation and quadrupole time-of-flight mass spectrometry (HPLC-ESI-Q-ToF). These techniques provided important information on the molecular composition and state of preservation of both archaeological wood and aged linseed oil.

Py(HMDS)-GC/MS was applied to assess the state of preservation of the main wood components, lignin and polysaccharides, in the presence of linseed oil and alum treatments. GC/MS and HPLC-ESI-Q-ToF were used to perform lipid characterization and to investigate the lipid degradation and oxidation processes. X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and

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