

Dissertation for the Degree of Doctor of Philosophy

**CONSERVATION OF THE WOOD
OF THE SWEDISH WARSHIP
VASA OF A.D. 1628**

Evaluation
of Polyethylene Glycol Conservation Programmes

BIRGITTA HÅFORS, M.Sc.

Department of Conservation

Academic dissertation in Conservation, to be publicly defended, by
due permission of the Faculty of Humanities at the University of
Gothenburg, on October 18, at 10 a.m. in Hall 10, the Main
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By: Birgitta Håfors, M.Sc.
Supervisor: Professor Emeritus Jan Rosvall, Ph.D.
External mentor: Professor Emeritus Ingvar Johansson

Abstract

The principal aim of this dissertation is to investigate whether or not polyethylene glycol (PEG) has acted as a dimension stabilizing agent of the Vasa wooden material, i.e. whether or not the PEG molecules have penetrated into the secondary cell wall, and in this have been enabled to preserve the capillary system through the drying and continuing maintenance periods.

This dissertation deals with the experimental work made at the Vasa conservation laboratory parallel to the conservation performance, with the aim to gain reasonable knowledge about the conservation parameters to proceed with the treatment, and to adjust the methods to needs observed. The experimental work was mainly performed as immersion treatments and with oak wood material removed from the Vasa hull as test material. The results were used at the surface application on the Vasa hull as well as at the immersion treatment of large loose timbers and wooden objects from the Vasa.

The achievement of an equilibrium between the PEG-concentration of the conservation solution and the PEG absorbed by the wood involved was agreed upon as a basis for the conservation procedure, but it soon became obvious that the equilibrium criteria were difficult to define.

The main conclusion of this dissertation is that the PEG's 4000, 1500 and 600 have acted as dimension stabilizing agents of the Vasa oak wood by an anti-shrink-efficiency (ASE) factor of 60% and higher, with amounts of 30% PEG and higher in the dry matter of the Vasa oak wood-PEG 4000, 1500 and 600 composites respectively.

Title: CONSERVATION OF THE WOOD OF THE SWEDISH WARSHIP VASA OF A.D. 1628
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Language: English with a Summary in Swedish

ISBN: 978-91-7346-687-5
ISSN: 0284-6578

e-publication: <http://hdl.handle.net/2077/23215>

Key words: Anti shrink efficiency (ASE), archaeological wet site, conservation, dimensional stabilisation, osmosis, polyethylene glycol (PEG), PEG conservation programme, immersion treatment, spray treatment, waterlogged archaeological wood, the Swedish warship Vasa of A.D. 1628, the Vasa oak wood-PEG composite.

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