



POLITECNICO DI TORINO
Repository ISTITUZIONALE

Use of freeze-drying for the recovery of water damaged documents

Original

Use of freeze-drying for the recovery of water damaged documents / Barresi A. A.; Crespi E.; Capolongo A.; Fissore D.. - STAMPA. - (2007), p. [poster #P2]. ((Intervento presentato al convegno 4th International Conference on Lyophilisation and Freeze Drying tenutosi a Dublin (Ireland) nel 17-19 October 2007.

Availability:

This version is available at: 11583/2317663 since: 2017-09-13T10:36:19Z

Publisher:

ISL-FD and PHSS

Published

DOI:

Terms of use:

openAccess

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

USE OF FREEZE-DRYING FOR THE RECOVERY OF WATER-DAMAGED DOCUMENTS

Antonello A. Barresi, Elena Crespi, Antonio Capolongo, Davide Fissore

Dipartimento di Scienza dei Materiali e Ingegneria Chimica, Politecnico di Torino,

C.so Duca degli Abruzzi 24, Torino, 10129, Italy

The use of evaporative freeze-drying has been investigated in this work as an efficient technique for the restoration of water-damaged papers and archive materials. The present work has the following aims:

1) setting a standard and reproducible method to prepare soaked and homogeneous samples; this step is necessary to assess the validity of the proposed procedure and has been quite often neglected in the past works in this field;

2) setting an experimental approach to analyse the sublimation phase inside the paper sample during the freeze-drying; an innovative procedure for the visualisation of the drying progress has been set up, based on the use of a liposoluble dye, evidencing the geometry of the ice core, whose volume decreases towards the sample core during freeze-drying. This allowed to validate the model predictions of the time evolution of the ice core volume.

3) applying freeze-drying (in a lab-scale apparatus, which allowed to monitor the temperature as well the weight of the samples) to water-soaked samples to restore the dried condition;

The final goal of this work is then to develop a simple mathematical model able to predict the time evolution of the moisture content in the sample. Experimental results have been successfully compared to the predictions of a simple phenomenological model, thus allowing the optimisation of the operation and the minimisation of the duration of the process.