

Mass Deacidification: Preserving more than Written Information

Michael Ramin[†], Evelyn Eisenhauer[‡] and Markus Reist[‡]

[†] *Research & Analytics, Nitrochemie Wimmis, Niesenstrasse 44, 3752 Wimmis, Switzerland.
michael.ramin (at) nitrochemie.com*

[‡] *Papersave swiss, Nitrochemie Wimmis, Niesenstrasse 44, 3752 Wimmis, Switzerland.
evelyn.eisenhauer (at) nitrochemie.com, markus.reist (at) nitrochemie.com*

Abstract: A vast number of books and archive materials worldwide are threatened by acid decay or ink corrosion. Till now, many investigations demonstrated the effectiveness of mass deacidification to stop the deterioration process. Different quality standards guarantee the safety for the original items and allow after the long experience of ten years in operation more conclusive evaluations than measurements based on artificial ageing. Diverse mechanical properties were examined, and with sophisticated methods it could be shown that the neutralization compound was totally penetrating the treated papers in a solvent based mass process. Besides deacidification, a magnesium-titanium based process is also suitable for a gentle treatment of papers threatened or even damaged by ink corrosion.

Keywords: Paper conservation, Mass Deacidification, Quality standards, Papersave Swiss Treatment.

I. INTRODUCTION

Today digitalization is on everyone's lips. However, preservation of the cultural heritage is more than digitalization of the information and scans or photographs of original items. Books and archive materials can tell us the story beyond the written information, about the person who manufactured the book, techniques in production of parchment, paper, cardboard, the organization of human knowledge and even fashion trends can be found (Grossenbacher, 2006). Unfortunately, a total of two thirds of all historically and culturally significant books and archive materials worldwide are threatened by acid decay or ink corrosion. To preserve such originals in the long run adequate conservation processes are required. After ten years in operation mass deacidification processes proofed their suitability and efficiency in stopping the acid caused paper decay by neutralizing the acids and building up an alkaline reserve. Comparative studies showed the effectiveness of the mass deacidification processes (Ramin *et al.*, 2009). Recently, further European studies in mass processes confirmed the successful neutralization of the acids in books and acknowledged the long experience of ten years in operation that provide analytically more conclusive evaluations compared to studies based on artificial ageing. Additionally, a process based on magnesium and titanium ethoxide demonstrated the suitability to treat ink corrosion (Effner, 2008).

II. OUTLINE

A consistent quality control creates the prerequisites for conclusive studies. In Switzerland the quality standards of the Swiss National Library and the Swiss Federal Archive are applied⁸⁹. Besides surface pH measurements the Swiss quality standards include the analysis of the alkaline uptake by XRF measurements, the homogeneity of the treatment, and color measurements. Over the ten past years a lot of data has been generated that successfully demonstrates the effectiveness of mass deacidification processes and the high quality involved.

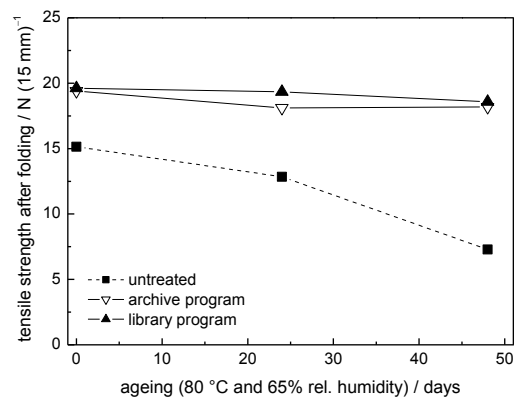


Figure 1. Tensile strength after Bansa-Hofer folding [6] against accelerated ageing.

Whereas the swiss quality checks are performed with the test books and the original materials, the German recommendation for quality management in preservation refrains measurements on original items but yet sets standards for a general process control) Hofmann and Wiesner, 2007). Exactly defined test paper has to be included in the treatment process to deliver relevant parameters on tensile strength, measured after Bansa-Hofer folding (Bansa and Hofer, 1980), and artificial ageing. Fig. 1 shows the strengthening effect of the papersave swiss treatment immediately after the process and the long-term effect on the paper usability. In further investigations different mechanical tests with and without ageing demonstrated

⁸⁹ Quality standards for the deacidification by the Papersave Swiss process, http://www.nb.admin.ch/nb_professionnel/erhalten/00699/01491/01492/index.html?lang=en

again the effectiveness of mass deacidification processes (Ramin *et al.*, 2009).

Fig. 2 displays the magnesium distribution crosswise through a sheet of paper. In a solvent-based process, the active neutralization compound is equally distributed and thus able to neutralize the acids in a sustainable manner.

Recent work (Effner, 2008) revealed the suitability of a solvent process based on magnesium and titanium ethoxide to treat ink corrosion. The advantages were the immobilization of the iron ions, and the absence of mechanical stress, as no swelling occurred. The surface character and the morphological structure of the historical inks have not changed.

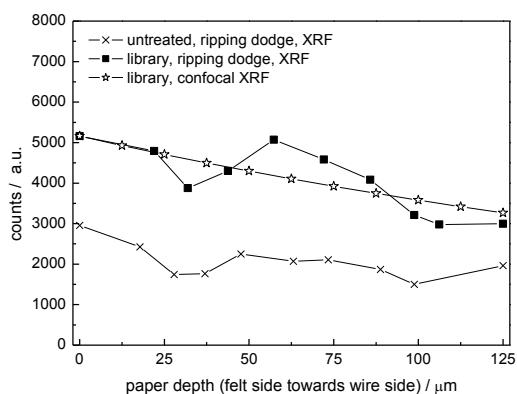


Figure 2. Comparison of the magnesium content of treated paper with the paper depth, measured by 3D-micro-XRF (asterisk) and normal XRF (squares). The magnesium content of untreated paper, analyzed by XRF, is depicted with crosses. For clarity, the signals of the 3D-micro-XRF are collated with the counts of the standard XRF for the felt side surface.

A vast number of good reasons to apply a mass deacidification process but yet digitalization is on everyone's lips. No doubt digitalization allows immediate public access to written information. However, mass deacidification is the only process to preserve the original cultural heritage!

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