A Comparative Study of the Direct Application versus Solvent Reactivation of Klucel G

Introduction

Abstract
Since it was first introduced to the conservation field, hydroxypropyl cellulose (HPC) has been of interest to conservators and conservation scientists alike. Today, the most used HPC is Klucel G, most often employed through direct application, but it is also used through solvent reactivation. The goal of this research project is to quantitatively determine the differences between these two application techniques using Klucel G. The strength of the adhesion will be tested using an Instron tensile test machine for the lap joint shear strength test and the T-peel test. The flexibility of the adhesion will be tested using a Taber-type tester to determine if one method of application forms a more flexible bond. Finally, the diffusion of the adhesive into the substrate will be tested using reflected light microscopy to speculate on the reversibility of the treatment. This research will be useful when making treatment decision.

Materials and Sample preparation

- All specimens were prepared using pure Japanese kozo unbleached paper.
- The appropriate concentration of Klucel G was based on past experience, consultation with professionals and preliminary testing. A solution of 8% Klucel G in ethanol was used for every stage of testing.
- The solvent reactivated specimens were reactivated for a period of 30 minutes.
- The direct application technique refers to the application of the adhesive on the substrate and immediately placed under weight to set, (see above).

Results

- Weight of specimens

Cross sections were done by cutting 3 mm X 3 mm squares from larger specimens. These were then adhered to a slide using Cargille liquid and observed using reflected light microscopy.

Conclusion

The direct application technique gives, for the parameters tested, a much stronger adhesion. This can be related to the greater diffusion of the adhesive in the paper support. The bond created is so strong, it can withstand a force capable of causing critical failure in an unaged pure kozo Japanese paper. Finally, it is possible to observe a variation in flexibility between the two methods of application. This can be correlated to the variation in the weight of the sample due to the loss of adhesive in the direct application method once it sets under weights. To obtain a better adhesion using solvent reactivation in paper conservation, it would be interesting to investigate other reactivation techniques, vary the time of reactivation and try different solvents.