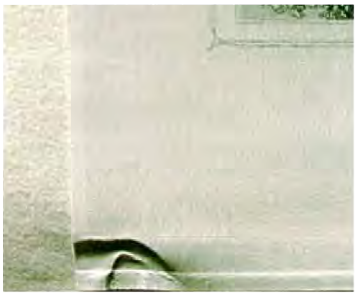
Albertina Compress

Enzyme poultice for the removal of
non-swellable starch based adhesives.

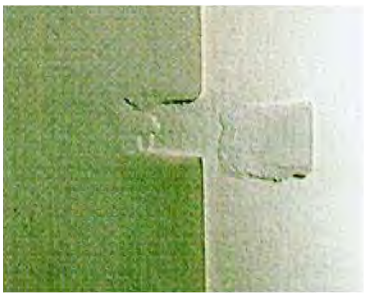
Product Information

For over hundreds of years starch paste has been an important adhesive material used for mounting paper materials. In the inventories of graphic collections, archives and libraries one finds large quantities of objects either glued or mounted with starch paste. Starch paste, in particular wheat starch paste, is well known for its remarkably high adhesive power and permanent elasticity.

A further advantage of starch paste is the ease of removal, which can be realized by swelling using moisture even after centuries of natural ageing. This is sometimes also required for removal or detachment of collection objects from books and covering boards. During the 19th century several graphic art collections started to modify the use of starch paste adhesives with further additives such as alum (calcium aluminum sulfate) and protein glue (animal) to achieve better durability. Due to the addition of these additives the paste hardens during the process of ageing and the ability to swell in water gets reduced.

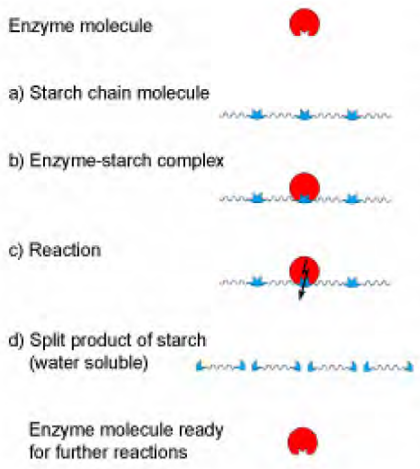


Today most of the works of graphic arts are heavily distorted if they have been mounted with these starch pastes modified with alum and protein glue. The modified starch pastes become brittle and are inflexible towards changes in relative humidity. These adhesive properties cause tension in the mounted originals resulting in distortions, strong folds, torn edges and creases.



In the Vienna Graphic Collection “Albertina“, a collection of 19th century prints, mainly engravings and lithographs are stored in albums (bound volumes of approx. 200 leaves on to which the prints are mounted). Figures 1-4 illustrate typical damages caused during ageing.

Another common mounting method is to mount passepartouts using four mounting strips with modified glue paste on all four edges of the work of art. Picture 5 shows the damage caused using this mounting method on Japanese papers. Similar problems with glue hardening and becoming brittle were also noticed in archival collections of autographs, where the pages were folded and mounted together at several points by starch paste and bound into a book format by sewing. In these cases the traditional mechanical methods to liquefy or remove the starch did not prove satisfactory. The special enzyme recipe facilitates the removal and detachment of hardened starch paste, especially in the case of large scale conservation projects, in an economical, quick and gentle manner.



Enzymes are highly complex protein molecules which can only be produced by living cells. Their main function is to accelerate (act as catalysts) specific bio-chemical reactions. In the case of amylase, the strength of the starch glue paste becomes reduced resulting in gentle detachment without fiber losses. The enzyme attaches itself, like in the key-hole principle, to a chemical bond, in this case an α-glucosidic bond (a) and then builds an enzyme-starch complex (fb). The bonds in the starch molecule get split (c) to form water soluble substrates (d). The enzyme molecule is then prepared for further splitting enzymatic reactions (depolymerization). For book/graphic conservation an enzyme gel was developed, permitting local detachment and removal of starch adhesive pastes (glue) under moisture-free conditions and with no fiber losses. For the requirements in the conservation and restoration workshops a ready-for-use enzyme gel with longer durability was needed. The solution for all these problems was found in the form of a synthetic fleece material which initially is soaked in the enzyme gel and then dried. In the dried enzyme poultice the enzymes were bound in a stable form, and with the addition of water, could immediately be activated before use. The poultice material containing the enzyme gel has the following functions:

• Undisturbed migration of the enzyme through the paper to the glue layer is possible
• Controlled moistening enables the enzymatic reaction and permits, after sufficient reaction time, detachment of the mounted items without losses and water stains.
• Minimal contamination of treated objects with enzyme gel - no residues left.

The enzyme poultice and its application have been tested extensively. The long-term effects on the tested papers have been studied by means of artificial ageing. It could be proved that the contamination of the paper with residual enzymes and additives was negligibly small. The degree of polymerization of the cellulose is unchanged after the treatment, i.e. the used enzyme is free of cellulose splitting contaminants.

Application Process

Moistening process of the poultice material.
Top: Paper interleaf
Middle: Enzyme poultice

Applying the poultice material.

Treatment of enzyme poultice under moderate weight conditions.

Detachment and removal of adhesive residues.