

Frequently Asked Questions

The following are some commonly asked questions about the Bookkeeper Deacidification Process and their answers. If you have other questions, please contact us.

1 What is the Bookkeeper Deacidification Process?

The Bookkeeper process preserves and protects all forms of paper based materials. It deposits a safe, non-toxic alkaline buffer into the structure of the paper. This buffer material neutralizes acids that can rapidly weaken the paper and cause it to become brittle.

The buffer materials are microscopic particles of an alkaline compound (magnesium oxide). The particles are dispersed and suspended in an inert liquid material (a blend of non-toxic materials). This dispersion can be applied by dipping or spraying. In contact with paper, the alkaline particles attach and blend with the paper structure, and the inert liquid simply evaporates. Because the formula contains no water, the liquid does not cause the paper fibers to swell or make the paper "wet," and it will not cockle or stiffen from the application.

The process does not require pretreatment drying or post-treatment off-gassing and reconditioning of the paper. In small batches, the materials to be treated are immersed in the treating bath, and gentle motions of the paper and liquid are used to help ensure uniform coverage. During this time, the treating bath is continuously circulated to filter loose dust and dirt from the books and to monitor and maintain the proper concentration of treating materials. Then the treating materials are drained, and the remaining liquid evaporates and is recovered in the process. Batches usually take about 2 hours total, and the moisture content of the paper is not affected by the treatment.

Materials are treated individually or in small batches to ensure quality control. The final pH of the paper following treatment depends heavily on the paper composition prior to treatment. The range of possible pH results is between 7 and 10, and typical results are in the range of 8.0 - 9.5. Sufficient alkaline material is added to the paper to provide a protective alkaline reserve. The typical reserve is equivalent to adding 1-1.5% by weight calcium carbonate, or 300 milliequivalents per kilogram.

Over the first few weeks following treatment, the magnesium oxide particles combine with moisture in the air to form magnesium hydroxide, also a non-toxic alkaline buffer. These buffer particles readily absorb and neutralize the acids in the paper. The material continues to absorb acid over the life of the paper. This is a permanent treatment that should not need to be repeated under normal storage conditions.

2 Is the Bookkeeper Deacidification Process effective?

Treated materials have been tested and compared with untreated control samples in independent tests conducted by the Library of Congress, the Institute of Paper Science and Technology (Atlanta), the Image Permanence Institute (Rochester), the Institut Royal du Patrimoine Artistique (Belgium), TNO Centre for Paper and Board Research (The Netherlands), Berner Fachhochschule (Switzerland), and the American Philatelic Society (State College). By using accelerated aging, these tests have shown that treatment by the Bookkeeper process should extend the usable life of paper based materials by a factor of at least 3-5 times. Although artificial aging does not exactly reproduce natural aging effects, the nature of the test is to err on the low side, and we expect the resultant life extension of treatment will exceed the predictions of accelerated aging.

3 How does the treatment work?

The alkaline particles deposited into the structure of the paper are extremely small. Average particle sizes are on the order of 1 micron. The particles are produced using a technology that gives them a very large internal surface area, 250 times the absorbing surface area of a normal particle. The large surface area helps the particles penetrate and attach to the cellulose fibers in the paper where they act like chemical sponges, absorbing acids.

(continued)

Corporate Headquarters
Preservation Technologies, L.P.
111 Thomson Park Drive
Cranberry Township, PA 16066
1 (800) 416.2665 Tel
1 (724) 779.2111 Tel
1 (724) 779.9808 Fax
www.ptlp.com

Canada
Japan
The Netherlands
Spain

(continued)

The acids in paper migrate freely. We see this effect when acidic paper damages adjacent, non-acidic materials. Alkaline buffered folders or boxes holding acidic papers can become acidic in just a few years time from this effect. Under normal storage conditions, acid reacts very slowly with cellulose fibers but very quickly with alkaline materials. The Bookkeeper process takes advantage of this difference in reaction rates to protect the paper. Within the structure of the paper, the acids migrate among the cellulose fibers where they are quickly absorbed and neutralized by the highly absorbent alkaline particles, long before they have time to react with and weaken the cellulose fibers.

4 What materials can be treated?

The Bookkeeper process is suitable for all paper-based materials, including bound and unbound documents, printed and handwritten materials, newsprint, books, letters and envelopes, postage stamps and paper collectibles, pamphlets, and flat stock such as maps and prints. The process uses no solvents and will not move, feather, loosen, or harm inks, adhesives, covers, leather, plastic, metals or fabrics.

The treating process is very gentle, but the materials to be treated should be in stable condition and able to withstand careful handling. Materials in poor repair or too fragile to handle are usually not considered good candidates for this treatment.

5 Is it safe for photographs?

The Image Permanence Institute tested photographic materials in contact with treated paper and determined that such an application satisfies the requirements of the Photographic Activity Test (PAT). But the process is not intended for use on photographs, and photographs will not benefit from the treatment. Photographs can safely be stored with treated materials with no adverse effect from the treatment.

6 Is it safe for colors and inks?

The Bookkeeper process contains no solvents and no water. Independent testing of hundreds of ink and paper samples from 1870 to now has found no inks or colors which are dissolved or caused to run or bleed by this material.

In a few cases, the shade of a color may be affected by the change in pH from acid to alkaline. But even pH sensitive colors are often not affected unless the paper becomes wet with water or in very humid conditions.

The Bookkeeper process should not be used on "blue prints" or other similar materials because these colors may be affected by raising the pH.

7 What about glossy or encapsulated materials?

Non-absorbent materials (such as plastic) can be included in the process without harm, but they will receive no benefit. The product does not penetrate the plastic coating of encapsulated materials. A light coating of alkaline material will be noticeable on the surface. This can be removed with a soft dry cloth.

The Bookkeeper process will provide limited benefits for coated paper materials. This type of paper will absorb less alkaline buffer and will usually have a light coating on the surface as well. The surface material can be removed by wiping, and the paper will retain some alkaline buffer.

8 Does it stop paper from yellowing?

No, papers like newsprint contain chemical impurities that are affected by light and oxygen. These will still tend to turn yellow over time. Treatment does not accelerate this effect.

9 Can raising the pH cause alkaline hydrolysis?

No, the maximum pH achievable using magnesium oxide, 10.4, is well below the value that is required to weaken the paper structure in this way. Alkaline hydrolysis occurs at much higher pH values, at much higher than normal temperatures, in the presence of excess liquid water.

10 Is it hazardous in any way?

The ingredients in the Bookkeeper process are non-hazardous, non-toxic, and non-flammable. The material dries odor-free, and it can be used in spaces with normal ventilation with no special exhaust requirements.

11 Is more testing planned?

Preservation Technologies has a commitment to conducting and supporting ongoing research into topics of deacidification. We are currently sponsoring research by independent agencies looking at aging paper in polluted environments, aging effects on leather, aging effects on iron gall ink, aging effects on textiles and artwork, reduced temperature accelerating aging tests, prompt effects on paper strength and prompt effects on art work. Please contact us to discuss details of these or other projects.