NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR

Conserve O Gram

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How To Preserve Acidic Wood Pulp Paper

Background

Early American papermakers used cotton and linen rags with relatively few additives to produce small quantities of strong and durable papers. Animal glue and gelatin sizing or coatings were added to help these long-fibered papers accept ink without bleeding.

This early American hand-made paper has long cellulose fibers and little grain, making it unusually strong. The sheet may have a feathered or deckled edge and/or a watermark.

Increased demand for paper led to the development of more efficient manufacturing processes. In 1806 a new sizing process was developed using alum to precipitate rosin on the paper fibers. Alum is acidic and removes calcium carbonate left from the washing process. The result was decreased permanence of the paper. The use of mechanical papermaking equipment during the Industrial Revolution led to less durable shorter fibered papers with a pronounced grain.

Along with alum/rosin, the addition of chlorine bleach led to further weakening of paper fibers and more paper acidity, discoloration, and brittleness. Each of these elements helped cause declines in the life expectancies of American paper.

The biggest single factor in paper deterioration may have been the change from rag and linen to ground wood pulp. Compared to rags, wood was widely available and inexpensive, making it an irresistible source of fibers for manufacturing paper.

Types of Wood Pulp Paper

- **Groundwood Pulp Paper.** Also known as mechanical wood pulp, it was first developed in the early 1800s and is used today for newsprint and pulp novels. Wood is mechanically ground to produce fibers for paper pulp. Grinding creates very short paper fibers, which are also highly acidic due to the retention of the wood's lignin.

  Lignin is a naturally occurring substance in wood that darkens and breaks down into acidic byproducts as it ages. Ground wood pulp paper is born acidic and rapidly becomes brittle. Therefore ground wood pulp paper has a relatively short life expectancy.

- **Chemical Wood Pulp Paper.** Also called soda, sulfite, sulfate or Kraft paper (depending upon how it is processed), chemical wood pulp paper was first developed in the mid-1800s. Chemical wood pulp paper is used today in printer and notebook papers, as well as in Kraft and Manila papers and boards.

  To make chemical wood pulp paper, wood chips are cooked in acidic or caustic chemicals that dissolve out the lignin, thus separating the fibers. Chemical wood pulp paper fibers tend to be longer and stronger since they weren't finely ground down as mechanical wood pulp papers are.

Chemical wood pulp papers tend to be slightly stronger than ground wood pulp papers and to have a greater life expectancy.