

Short Communication

Role of acid-free paper in libraries: A survey

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Acid-free paper is a paper that has a neutral or basic pH (7 or slightly greater). It can be made from any cellulose fiber as long as the active acid pulp is eliminated during processing. It is also lignin and sulfur free. Acid-free paper addresses the problem of preserving documents for long periods.

Key words: Overview, standards, logo of acid-free paper, archival paper, preservation, Durabook.

INTRODUCTION

Paper made from wood-based pulp that has not had its lignin removed goes yellow and deteriorates over time. When exposed to light and/or heat, the molecules in the acidic paper will break down even faster. It was only in the 1930s that the effects of wood-pulp paper became known, when William Barrow (a librarian) published a report about the deterioration of acidic paper in the libraries. For fear of the gradual disintegration of written materials, measures have been taken to improve the quality of paper.

During production, acid-free paper may be treated with a mild base (usually calcium or magnesium bicarbonate) to neutralize the natural acids occurring in wood pulp, and it may also be buffered to prevent the formation of additional acids (as may develop from the application of sizing).

Bicarbonate is added in excess, to supply the paper with an alkaline reserve to provide protection from further attack by acids remaining in the paper or supplied by the environment (e.g. atmospheric sulfur dioxide). The bicarbonate during drying loses carbon dioxide and water and is converted to calcium carbonate or magnesium carbonate. In order for paper to last at least 100 years it must have an alkaline reserve of 2% or more. Today, much of the commercially produced paper is acid-free,

but this is largely the result of a shift from china clay to (cheaper) chalk as the main filler material in the pulp: chalk reacts with acids, and therefore requires the pulp to be chemically neutral or alkaline. The sizing additives mixed into the pulp and/or applied to the surface of the paper must also be acid-free.

Alkaline paper has a life expectancy of over 1,000 years for the best paper and 500 years for average grades. The making of alkaline paper has several other advantages in addition to the preservation benefits afforded to the publications and documents printed on it. Because there are fewer corrosive chemicals used in making alkaline paper, the process is much easier on the machinery, reducing downtime and maintenance, and extending the machinery's useful life. The process is also significantly more environmentally friendly. Waste water and byproducts of the papermaking process can be recycled; energy can be saved in the drying and refining process; and alkaline paper can be more easily recycled.

Standards

The company Hercules Incorporated developed the first alkaline size in the 1950s that made acid-free paper

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possible. Despite the advances in paper making and the identification of and concern around the brittle book problem, it took decades before the adoption of ANSI NISO Standard Z39.48-1984 - *Permanence of Paper for Publications and Documents in Libraries* in 1984. This voluntary standard covered pH value, tear resistance, alkaline reserve, and lignin thresholds for paper to last thousands of years and was developed to encourage the use of acid-free paper in library materials. The development of the initial standard was a result of the work of the Council on Library Resources, which effectively lobbied ANSI to adopt the guidelines.

In 1986, Standards Committee II of NISO was established to expand Z39.48-1984 to develop standards for coated paper, and was again called upon in 1988 to review and revise the standards for uncoated paper.

There are various standards for "acid-free" paper, with differing requirements. In some quarters, paper having a pH between 6 and 7 is often also considered acid-free. Acid-free (alkaline) paper that additionally is *uncoated* and meets certain *standards for folding and tearing* is authorised by the American National Standards Institute (ANSI) to carry the following notice: "The paper used in this publication meets the minimum requirements of the American National Standards Institute for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48-1992."

The objective of ANSI Z39.48-1992 "is to establish criteria for coated and uncoated paper to last several hundred years" under optimal conditions in libraries and archives. The desired outcome of the standard is to reduce future preservation problems.

The scope of the standard is to cover publications and documents bought and maintained by libraries and archives. Such works include scholarly journals, periodicals, monographs, government documents, original documents, and significant works in fiction and non-fiction. An equivalent international standard, ISO 9706, was published in 1994.

Manufacturers of acid-free paper can indicate the compliance of their product with the test requirements of the ISO 9706 or ANSI Z39.48-1992 standards using a circled infinity symbol (Unicode codepoint 267E,).

Logo of Acid-Free Paper

Logo found in many books printed on acid-free paper. It is usually accompanied by the various text (Figure 1).

Archival paper

Archival paper is an especially permanent, durable acid-free paper (Ivar, 2009). Archival paper is meant to be used for publications of high legal, historical, or significant value. In the USA, such paper must also be approved in accordance with the ANSI standards. The international



Figure 1. Logo of acid-free paper.

standard for "permanent" paper is ISO 9706 and for "archival" paper, the standard is ISO 11108.

Often, cotton rag paper is used for archival purposes, as it is not made from wood-based pulp. Thus, *archival paper* is sometimes broken down into two categories:

Conservation-grade — acid-free, buffered paper made from wood-based pulp.

Archival-grade (also Museum-grade) — cotton rag paper made from cotton pulp.

Preservation

Preservation is a branch of library and information science concerned with maintaining or restoring access to artifacts, documents and records through the study, diagnosis, treatment and prevention of decay and damage.

It should be distinguished from conservation which refers to the treatment and repair of individual items to slow decay or restore them to a usable state. Conservation is occasionally used interchangeably with preservation, particularly outside the professional literature (Gerald, 2009).

Preservation librarians most often work in academic libraries. Their focus is on the management of preservation activities that seek to maintain access to content within books, manuscripts, archival materials, and other library resources (Arnold 2002; Teygeler, 2004). Examples of activities managed by preservation librarians include binding, conservation, digital and analog reformatting, digital preservation, and environmental monitoring.

Durabook

Another form of "archival paper" is being made from recycled plastic in the form of Durabook (Cedzova, 2006). This is a patented material and process developed by Melcher Media, a New York publisher. Plastic paper does not have lignin to cause acid problems or cellulose fibers that can break from folding. It also will not be damaged if soaked in water and, if the book gets dirty, can be washed. The only issues to consider are what type of plastic is being recycled and if those plastics will break down in the future.

Conflict of Interests

The author has not declared any conflict of interest.

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