

TECHNICAL NOTES

Conservation Pamphlets

The Library of Congress has produced the following useful pamphlets in response to enquiries on polyester encapsulation and deacidification techniques:

Library of Congress publications on conservation of library materials. Conservation workshop notes on evolving procedures, series 500. No. 2 Deacidification—Methyl Magnesium Carbonate Non-Aqueous Treatment. Working Draft, August 1976. 12 pages.

Library of Congress publications on conservation of library materials. Conservation workshop notes on evolving procedures, series 500. No. 1. The deacidification and alkalization of documents with magnesium bicarbonate. Working Draft, August 1976. 16 pages.

Office of the Assistant Director for Preservation. Administrative Department, Library of Congress, 15 October 1975. The physical protection of brittle and deteriorating documents by polyester encasement. 8 pages. (N.B. A more comprehensive booklet on this subject is currently being prepared by the Library of Congress).

Lee McGregor

The Effects of Different Treatments to Paper

In this note it is only possible to touch on procedures which could be useful in evaluating paper materials after restoration treatment. Several useful standard methods are available for the testing of paper; the challenge must be to select meaningful tests and to interpret and judge the significance of the data.

Neimo¹ has listed at least fifty references to laboratory conditions that have been used for the accelerated aging of both cellulose and paper. Temperatures range from 22°C to 160°C, the relative humidity from 1% to 100%, and the time between one hour to 280 days. Some of the systems were open, and some closed. A number of researchers, including Luner, Browning, Richter and Wells, have discussed the many variables associated with the accelerated ageing of paper, and they have also made valuable suggestions about conditions, which have to be controlled in accelerated ageing. All agree that moisture must be present in the test samples and that temperatures should be below 100°C. As late as 1977 the only standard method for the ageing of paper in the U.S. was oven ageing at 105°C,² but this is not considered suitable for restoration laboratories.

Browning and Wink,³ and Richter and Wells⁴ suggest a 'closed tube' effect at 90°C and 85°C, but it is suggested that a somewhat lower temperature would be preferable. In both cases the tubes had been filled with paper that had been equilibrated at 23°C and 50% R.H. The tubes were placed in an oven or in an oil bath for ageing, and the paper retained its moisture content during the ageing process. Either of the methods described would be suitable for restoration laboratory ageing tests.

Studies of accelerated ageing of paper have shown that oxidation,

hydrolysis, yellowing and crosslinking occur to different extents depending of the presence of oxygen and moisture. Aluminium attached to the carboxyl groups in the cellulose is very damaging to the stability of most, if not all, paper. Therefore papermakers-alum or any other aluminium salts must be avoided in all restoration work.

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NOTES AND REFERENCES

1. L. Neimo., 'Accelerated Heat Ageing of Cellulose', *Paperi Ja Puu*, Vol. 46 No. 7 (1964).
2. 'Effects of Heating on Folding Endurance (Relative Stability of Paper)', *TAPPI* T453: 'Relative Stability of Paper', ASTM D776.
3. B. L. Browning and W. A. Wink, 'Studies on the Performance and Durability of Paper', *TAPPI* Vol. 51 No. 4 (1968), p.156.
4. G. A. Richter and F. L. Wells, 'Influence of Moisture in Accelerated Ageing of Cellulose', *TAPPI* Vol. 39 No. 8 (1956), p. 603.