

Abstract Submitted
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Comparing the Bending Stiffness Measurements of Brittle Paper¹

ANDREA HALL, MOLLY MCGATH, PATRICIA MCGUIGGAN, Johns Hopkins University — It has been estimated that one third of the paper materials in libraries are too brittle to handle. A typical paper sheet is comprised of semi-rigid cellulose fibers that are more than ten times longer than the sheet thickness and can be considered a two dimensional random fiber network. The main pathways of degradation, acid-catalyzed hydrolysis and oxidation, cause depolymerization of the cellulose chains and breaking of the intrafiber bonds. Conventional mechanical measurements of aged paper are destructive and often too severe to understand the true extent of deterioration. By comparing the roll test, folding endurance tests, tensile tests and stiffness tests of naturally aged papers with varying amounts of brittleness, we intend to show the limits of each test and relate the state of the paper degradation to the mechanical test results.

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