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The lightfastness of ballpoint pen inks in air and modified environments

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ABSTRACT

Because it is well known that some ballpoint pen inks contain light-sensitive dyes such as methyl violet, rhodamine and eosin, exhibition guidelines typically recommend that their display should be highly restricted. This project set out to survey the light-sensitivity of approximately 100 randomly selected red, black and blue ballpoint pen inks under otherwise ambient conditions (in air at 50% RH) using the accelerated microfade technique and, because low RH and "anoxic" display are commonly assumed to suppress light-fading, the tests were repeated at 1% RH (in air) and at less than 10ppm O_2 (at 50% RH).

The light-sensitivity of individual inks of all three colours ranged from negligible to much worse than that of Blue Wool 1 (BW1) - well beyond response rates for which display of facsimiles are usually considered necessary. Lightfastness was not associated with appearance, "quality" brands, probable year of manufacture, and perhaps not even to the main dye or pigment used, because inks with apparently identical spectra (400-1000nm) sometimes responded very differently. Some of the data suggests that this may be due to colourless ink components or photochemical reaction products acting as photo-catalysts.

Overall light-sensitivity (□E) usually declined substantially in anoxia, however the opposite was true of a quarter of the red inks and one blue ink. Contrary to expectations even very low RH failed reliably suppress fading and, like oxygen restriction, sometimes had the opposite effect. Further confusing the picture, the effects of modified environments were complex, for example suppressing loss of legibility (□L*) whilst accelerating hue and chroma changes (□a*& □b*).

The results vividly illustrate that there are no reliable general exhibition recommendations applicable to ballpoint pen inks, either in terms of cumulative exposure or modified environments. Some inks are so fugitive that even very conservative published exposure recommendations will relatively quickly lead to their destruction while the display of many others will be unnecessarily circumscribed, denying the public an opportunity to see them. Aside from facsimiles, microfade testing prior to exhibition is currently the only low-risk solution to this dilemma.

BIOGRAPHY

Bruce Ford is an independent Canberra based conservation science consultant to collecting institutions in Australia and elsewhere, and a volunteer researcher at the National Museum of Australia (NMA). He also works occasionally as a rock art conservator and researcher. He has a BSc Hons (Chemistry) from the University of Canterbury, Post Graduate Diploma (Conservation) from the University of Canberra and an M.A. (Museums and Collections) from the Australian National University. His current interest is in the photochemistry and lightfastness of cultural material, in particular the application of microfade testing to the display of gallery and museum collections and as a research tool.

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