Reducing Agent Tert-Butylamine Borane Complex and Its Use in Stain Reduction on Paper-based Artifacts

Stain reduction is sometimes a necessary but often ethically loaded consideration in the treatment of art on paper. From the standpoint of cellulose stability, reducing agents are considered preferable to their oxidizing counterparts as they have the potential to mitigate discolorations without further degrading the polymer backbone of paper artifacts. Although several oxidizing agents have been tried with paper substrates, sodium borohydride has long been the primary, if only, reducing agent. Recent work with gellan gum at the Canadian Conservation Institute has brought another reducing agent to the attention of paper conservators: tert-butylamine borane complex (TBAB). Explored by Italian researchers and conservators since the late 1990s, borane complexes show great promise as an additional tool for reducing paper discolorations but seems little known in North America. Several disadvantages of sodium borohydride (its tendency to evolve bubbles of hydrogen gas and the high working pH) are not present with TBAB, which shares borohydride's advantage of being soluble in both alcohol and aqueous systems. This paper will present the use of TBAB in the treatment of several watercolors by Canadian artist Lucius O'Brien, as well as on didactic paper artifacts. A discussion of the working properties, as well as the perceived advantages and challenges of using this reducing agent, will ideally familiarize more paper conservators with this relatively new reducing agent, broadening their choice of stain reduction agents.

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