THE CHARACTERIZATION OF THREE UV-INHIBITING FIXATIVES USED FOR WORKS OF ART ON PAPER
Erin K. Jue and Melissa Buschev, New York University, Institute of Fine Arts, Conservation Center

Introduction
This project investigates three fixatives that have been introduced and marketed as confirming "UV protection against harmful light rays." These products are PaperBright™ by Preservation Technologies, Krylon UV-Resistant Clear Acrylic Coating™ and Utrecht UV-Resistant Clear Acrylic Coating™. Margaret Hillis Eibs' article entitled, "The Shifting Function of Artistic Fixatives," discusses how artists' fixatives have changed in function from the mechanical consolidation of powdery pigment applied by an artist to the chemical consolidation and maturing by either an artist or a concerned curator in the name of preservation.

To gain a better understanding of the chemical and aesthetic consequences of applying these sprays, the purpose of this project has been outlined:
- To determine the composition of the three fixatives
- To gauge their efficacy

Discussion
Severe fading of the construction paper and markers was noted in five of the six samples, both in the sprayed and unsprayed specimens. As the PrismaColor Colored Pencils and the red Rose Art marker did not change in appearance after being exposed to sunlight in the control samples, the efficacy of the various sprays in protecting these media from light could not be determined.

As no differences in the extent of fading were observed between the samples sprayed with Utrecht Ultra Clear Acrylic Coating™ and Utrecht UV-Resistant Clear Acrylic Coating™ or between the samples coated with Krylon UV-Resistant Clear Acrylic Coating™ and Krylon Crystal Clear Acrylic Coating™, the presence of the UV ab- sorbance in both the Utrecht and Krylon sprays seemed to be ineffective in conferring protection against light for the length of the testing period. In addition, the positive identification of zinc oxide by microscopy in PaperBright™ was surprising. While zinc oxide is a common art medium pigment that may provide protection from light, it has been known to catalyze the formation of hydroxides present in the presence of water when exposed to near UV light. Vincent Daniel suggests following the mechanisms for the breakdown of zinc oxide in the presence of light and water:

\[ \text{ZnO} + \frac{1}{2} \text{H}_2\text{O} + \text{O}_3 \rightarrow \text{ZnO}_2 \cdot \text{H}_2\text{O} \]

Some of these reactive species can then degrade cellulose chains within paper, producing yellow and brown discoloration. While both Krylon sprays and the Utrecht UV-Resistant Clear Acrylic Coating™ are composed of PMMA, it is interesting to now in the comparative study that the Utrecht Ultra Clear Acrylic Coating™ is composed of polyethylene, a plastic known for its propensity to discolor and become brittle in the presence of light.

Conclusion
From the results of natural light aging, the sprays with and without UV protection did not appear to prevent the majority of the media and supports from fading.

We would not recommend these fixatives for the purpose of protecting works of art in paper from damage caused by light. While both Krylon sprays and Utrecht UV-Resistant Clear Acrylic Coating™ consisted of PMMA, PaperBright™ was found to contain zinc oxide and Utrecht Ultra Clear Acrylic Coating™ to contain polyethylene.