THE LIGHTFASTNESS OF *WINSOR & NEWTON* AND *DR. PH. MARTIN'S* INKS ON PAPER

SANDRINE BLAIS, ART CONSERVATION PROGRAM

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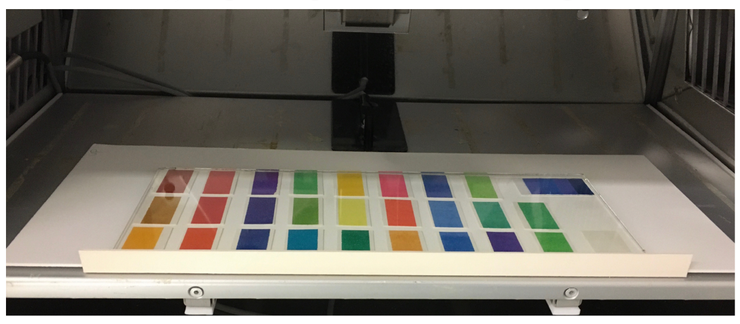
WINSOR & NEWTON DRAWING INKS

DR. PH. MARTIN'S SYNCHROMATIC TRANSPARENT WATER COLORS

INTRODUCTION

This project studied the lightfastness of modern artist dye-based inks for works of art on paper in collaboration with Crystal Maitland and Dr. Eric Hagan from the Canadian Conservation Institute. A previous research methodology developed at CCI, which studied the lightfastness of historic dyes on textiles, was adapted to study the fading of dye-based inks on paper. Twenty-six inks from both Winsor & Newton's Drawing Inks and Dr. Ph. Martin's Synchromatic Transparent Water Colors were artificially light aged and their lightfastness were assessed.



Samples in the Q-SUN test chamber at Queen's University.

Samples in the LED fadometer at CCI. (Photo provided by Eric Hagan).

EXPERIMENTAL

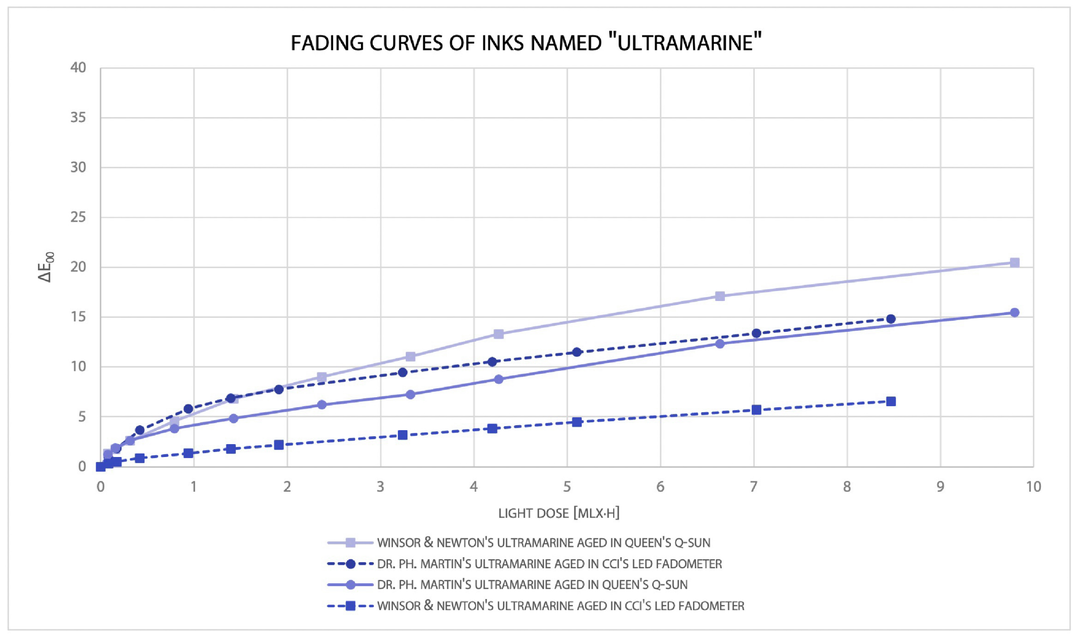
Samples were prepared on Arches Watercolour Paper (140lb, Hot Pressed) using a calligraphy pen with a 15mm poster nib, then aged at both Queen's University and CCI. At Queen's University, samples were aged using a Q-SUN test chamber at 1.1 W/m²/nm at 420nm and 25°C under a sheet of Tru Vue Museum Glass, to replicate UV-filtered daylight lighting conditions. Colour measurements were taken with a Konica Minolta 700d spectrophotometer before, during and after light ageing. At CCI, samples were aged at room temperature (approx. 21°C) with a fadometer using a warm-white LED illuminant, characteristic of modern gallery lighting. Colour measurements were taken with a Konica Minolta CM-2600d spectrophotometer before, during and after light ageing.

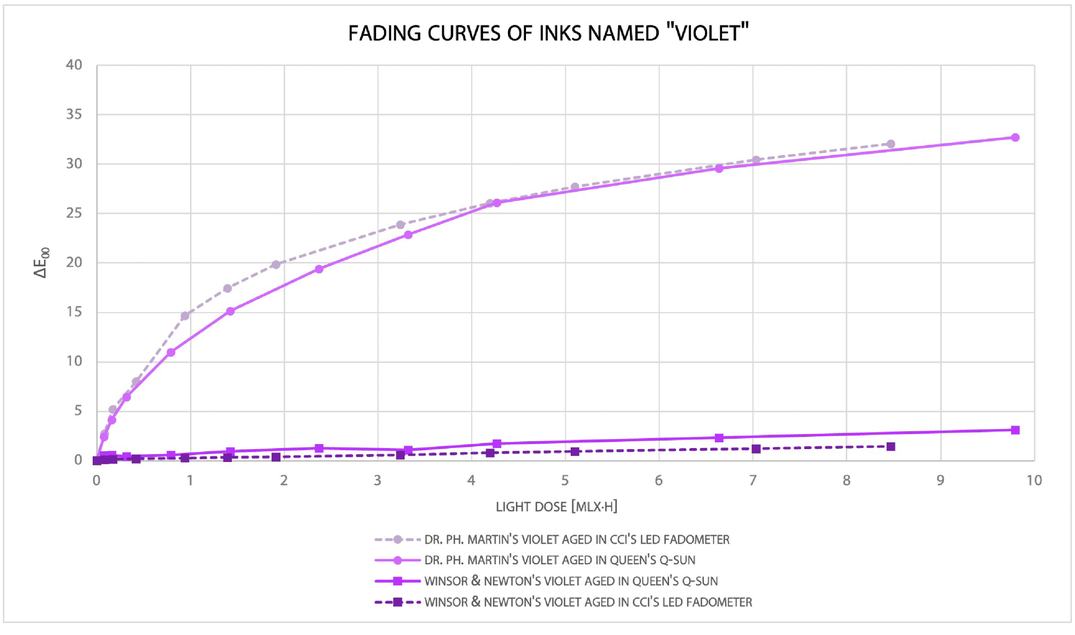
Samples before ageing (left) and after ageing in the Q-SUN at 1.10 W/m²/nm at 420nm, 25°C for 10 Mlx·h (right).

RESULTS AND DISCUSSION

Winsor & Newton's Drawing Inks for the most part exhibited larger colour differences than Dr. Ph. Martin's Transparent Water Colors. Some inks from the two manufacturers bearing the same name (e.g. Violet) had vastly different fading rates, others (e.g. Ultramarine) showed comparable fading curves.

Most inks required a larger light dose with the LED illuminant to achieve a JND (Just Noticeable Difference) relative to the Q-SUN. Table 1 shows the light dose [Mlx·h] required to reach a JND (ΔE_{00} = 1.70). The lower the dose required to reach the JND, the more light sensitive the ink is. Most inks (23 with the LED, 25 with the Q-SUN) equal blue wool standards 1-3 and are therefore considered highly light sensitive.





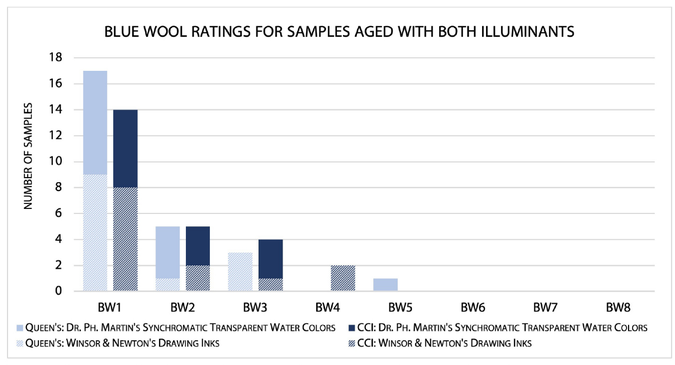


Table 1. Blue wool ratings for samples aged with both illuminants

Sample Name	CCI's LED fadometer		Queen's Q-SUN	
	Dose to JND [Mlx·h]	BW rating	Dose to JND [Mlx·h]	BW rating
Violet (Dr. M)	0.05	1	0.06	1
Scarlet (W&N)	0.07	1	0.05	1
Viridian (Dr. M)	0.11	1	0.06	1
Vermilion (W&N)	0.15	1	0.12	1
Emerald (Dr. M)	0.15	1	0.13	1
Ultramarine (Dr. M)	0.16	1	0.14	1
Viridian (W&N)	0.21	1	0.06	1
Prussian Blue (Dr. M)	0.25	1	0.10	1
Blue Wool Standard 1	0.21	1	0.27	1
Cobalt (W&N)	0.31	1	0.06	1
Emerald (W&N)	0.33	1	0.12	1
Apple Green (W&N)	0.34	1	0.12	1
Brilliant Green (W&N)	0.37	1	0.13	1
Nile Green (Dr. M)	0.37	1	0.36	1
Blue (W&N)	0.48	1	0.09	1
Blue Wool Standard 2	1.21	2	0.61	2
Carmine (Dr. M)	0.86	2	0.51	1
Ultramarine Blue (W&N)	1.30	2	0.15	1
Sunshine Yellow (W&N)	1.62	2	0.81	2
Yellow Ochre (Dr. M)	1.63	2	0.20	1
Burnt Sienna (Dr. M)	1.75	2	0.71	2
Blue Wool Standard 3	7.67	3	3.87	3
Chrome Yellow (Dr. M)	2.90	3	1.68	2
Vermillion (Dr. M)	4.18	3	1.64	2
Scarlet (Dr. M)	4.40	3	1.41	2
Canary Yellow (W&N)	7.01	4	2.15	3
Burnt Sienna (W&N)	2.94	3	2.35	3
Violet (W&N)	10.00	4	4.26	3
Blue Wool Standard 4	TBD	4+	16.03	4
Hooker's Green (Dr. M)	TBD	TBD	19.83	5
Arches Watercolour Paper (140lb, Hot Pressed)	TBD	TBD	TBD	TBD

CONCLUSIONS

Light ageing of modern inks on paper was performed to quantify their rate of colour change under two illuminants: UV-filtered daylight, and warm-white LED. Results from both illuminants showed that nearly all inks were highly light sensitive (BW1-3), and were skewed toward the highest sensitivity of BW1. Colour change was typically faster with the daylight illuminant than the LED. The resulting dataset will contribute to CCI's light aging database. For comparison, further research may be performed with different illuminants, particularly daylight without UV filter.

REFERENCES

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