Article: A Cost Effective Method for Removing Dry Mount Tissue from Photographic Prints
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A Cost Effective Method for Removing Dry Mount Tissue from Photographic Prints

Cheryl Jackson

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ABSTRACT

Photographic prints have commonly been adhered to their supports with dry mount tissue. Early tissues used a shellac based adhesive that was superseded in the 1970's by synthetic adhesives. The formulation of these synthetics was a closely guarded commercial secret.

Removing photographic prints from acidic mount boards when they have been mounted with dry mount tissue can be extremely time consuming, which means it is also an expensive process.

Vapor chambers and immersion baths have been used in the past with success, but here, a passive, cost effective system for removing dry mount tissue has been developed. Synthetic tissues have been analyzed using FTIR and solvents found for them using the Teas Chart. This system could also work for whole pages from self-adhesive albums.

A mounted print is placed in a simple zip-lock bag with a barrier layer and a piece of thick blotter soaked in solvent. The system is sealed and left alone for several hours. At the end of this time, the dry mount tissue can simply be peeled away from the print leaving the back of the print undamaged, clean and flat. This system literally reduces the time spent on this procedure from hours to minutes, with the added bonus that other work can take place while the system is working without intervention.

The system takes almost no time to set up or monitor, uses far less solvent than a chamber or bath, and the materials used in the system are inexpensive and readily available. The materials are also completely reusable, saving on consumables.

INTRODUCTION

Photographs mounted with dry mounting tissues can be extremely difficult and time consuming to remove from their backboards. A faster, more efficient method is required. Vapor chambers and immersion baths have been used in the past with success, but a system that uses less solvent would benefit the environment and the budget. A low cost, low impact system has been developed here.

SET UP

Five samples of dry mount tissue were sourced. Four historic tissues were purchased from EBay: an early Kodak Dry Mounting Tissue, a somewhat later Kodak Dry Mounting Tissue Type 1, Kodak Dry Mounting Tissue Type 2, and Seal MT5 Permanent Dry Mounting Tissue. A

contemporary product, Bienfang Colormount Permanent Dry Mounting Tissue, was also purchased as it was felt that it would be unlikely for modern photographic prints to be mounted with historic shellac-based tissues (see figures 1-5).

Fig.1 An early Kodak Dry Mounting Tissue.

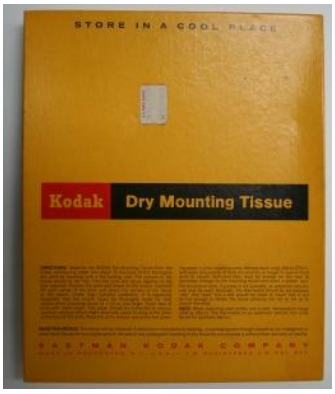


Fig. 2 A somewhat later Kodak Dry Mounting Tissue.

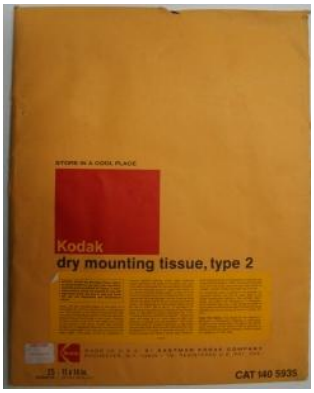


Fig. 3 Kodak Dry Mounting Tissue Type 2.

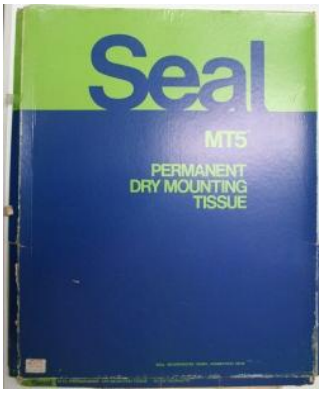


Fig. 4 Seal MT5 Permanent Dry Mounting Tissue.

Fig. 5 Bienfang Colormount Permanent Dry Mounting Tissue.

Two more self-adhesive products were found in our paper store and added to the sample set (see figures 6 and 7):

Fig. 6 Elmers Self-Adhesive Foam Board.

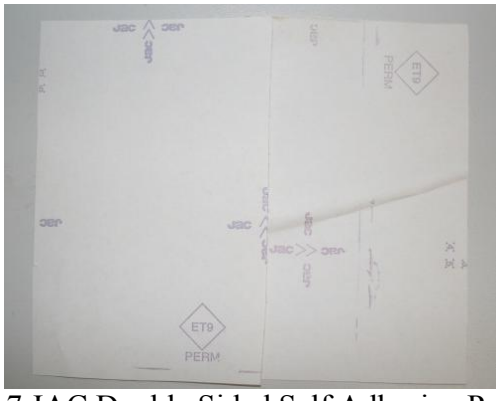


Fig. 7 JAC Double Sided Self Adhesive Paper.

These tissues were used to mount a variety of photographic prints to 2-ply conservation-quality mount board secondary supports. The photographic processes selected for testing were as follows:

- Silver gelatin fiber based prints, c 1950
- Silver gelatin resin coated prints, c 1990
- Epson Ultrachrome black and white print on Epson photographic paper, c 2006
- Epson Ultrachrome black and white print on Epson photographic paper, 2012
- Fuji Pictrograph black and white print on Pictrograph paper, c 2006
- Chromogenic color prints on Kodak resin coated paper (square format), c 1980
- Chromogenic color prints on Kodak resin coated paper (4 x 6" format), c 1985
- Chromogenic color prints on Fujicolor resin coated paper, c 1985
- Chromogenic color prints on Sakuracolor resin coated paper, c 1985
- Chromogenic color prints on Fuji digital exposure, resin coated paper, 2012
- Epson Ultrachrome color print on Epson photographic paper, 2012
- Dye based inkjet print on generic photo paper, 2012

This ensured that the prepared samples include various historic prints mounted with historic tissues, historic prints mounted with modern tissues, and modern prints mounted with modern tissues.

These known samples were then supplemented by a selection of historic, mounted photographs.

Sample 1 Sample 2 Sample 3 Sample 4

Fig. 8 Mounted Silver Gelatin and Chromogenic Prints

PROCEDURE

All of the dry mount tissue samples were analyzed using Fourier transform infrared (FTIR) spectroscopy in order identify the main component(s) present within the adhesive layers. The results indicated that the adhesives were based on one of the three following materials: shellac, polymethyl methacrylate, or an ethylene vinyl acetate copolymer.

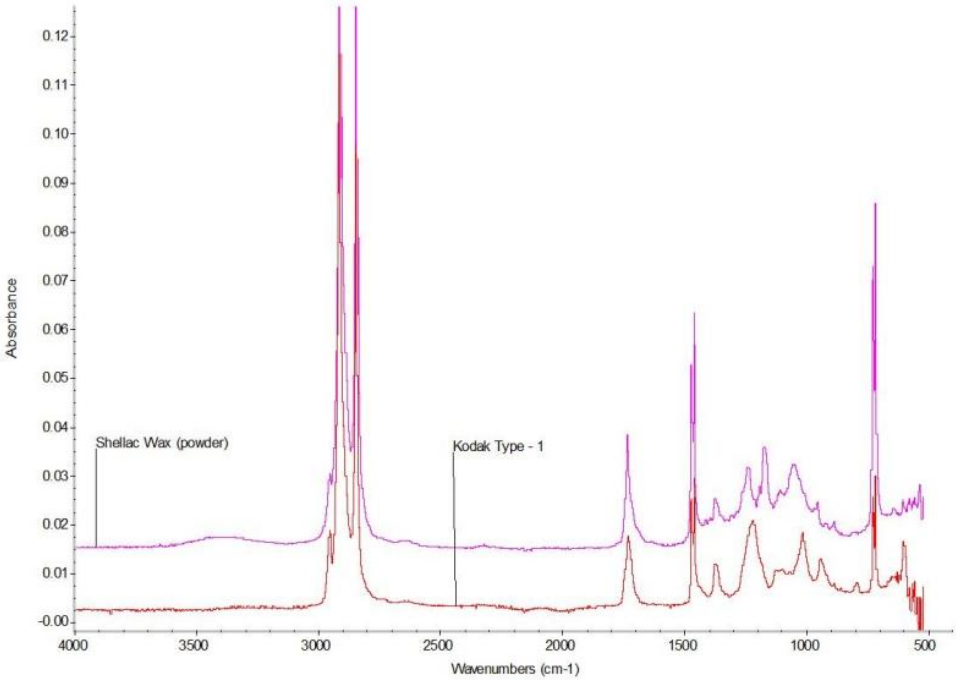


Fig. 9 FTIR spectra of Kodak Dry Mounting Tissue overlaid with a reference library spectra of shellac.

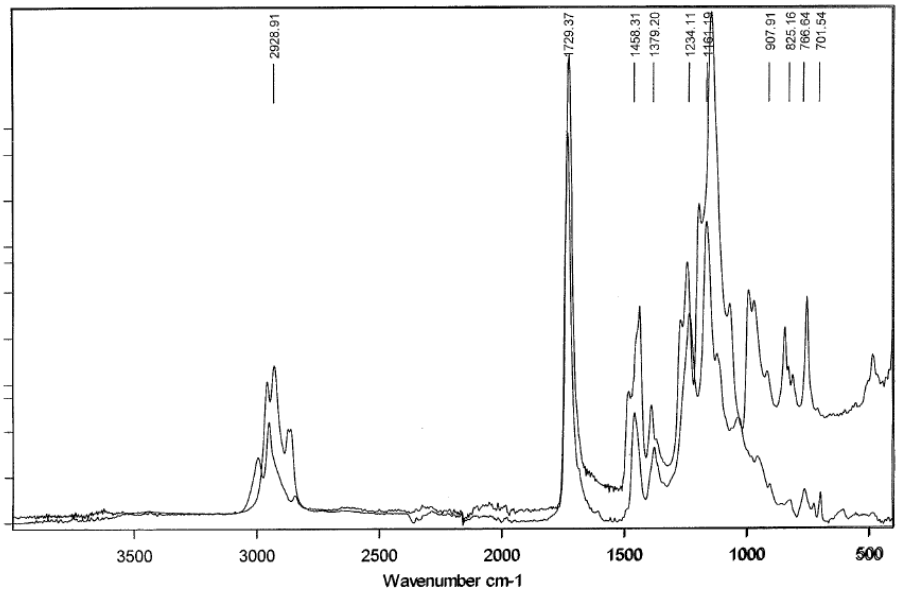


Fig. 10 FTIR spectra of Elmers Self-Adhesive Foam Board overlaid with a reference library spectra of polymethyl methacrylate.

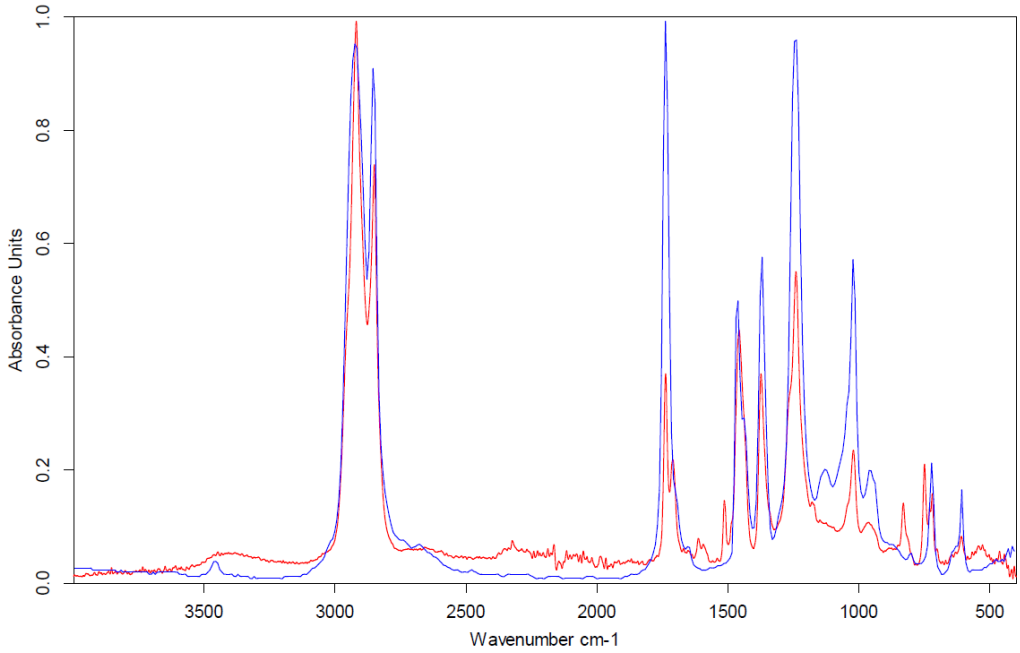


Fig. 11 FTIR spectra of Bienfang Colormount Permanent Dry Mounting Tissue overlaid with a reference library spectra of ethyl vinyl acetate.

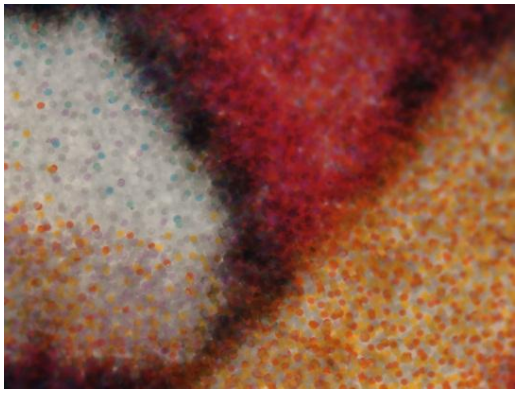
All of the prints that required mounting were joined to their backboards and tissues using a domestic iron on "Synthetic" setting with no steam. This procedure was used as it was specifically described on the tissue packs if a professional mounting press was not available. After heating, the prints were immediately placed under a weight to allow them to cool flat. This was especially necessary for the Kodak Type 2 tissue as it was very slippery and soft while hot, and would release around the edges of the print if not cooled under pressure (Wilhelm 1993)

The earliest Kodak product proved very difficult to work with. The tissue sheets had adhered to each other while in the package, but would not longer adhere to the prints or the mounting boards when heated (Wilhelm 1993). Repeated attempts with different temperature and different heating appliances could not achieve a bond. This tissue was then excluded from the rest of the project.

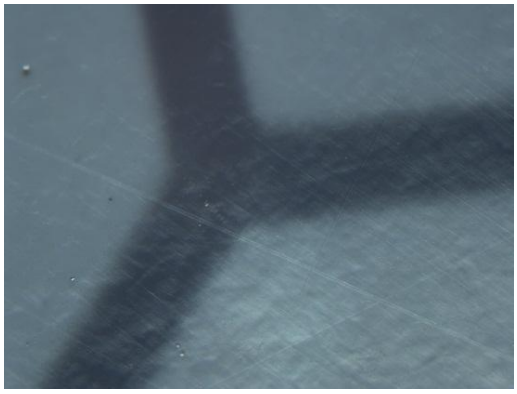
After setting up the samples, there were 12 print types on 6 tissue types.

Fig. 12 Mounted black-and-white and color sample prints.

Each type of photographic print included in the sample set was photographed under 30x stereo magnification to set a base line for the condition of the material before it was exposed to long hours in a solvent vapor chamber.



Detail: pigment inkjet print



Detail: silver gelatin fiber based paper

Fig. 13 Examples of the baseline 30x magnification pre-treatment photodocumentation.

Each sample print was placed individually into a vapor chamber made using two zip-lock polyethylene bags, as seen in figure 14.

Two layers of thick blotter were inserted into zip-lock bag and, for a 4x6" print, approximately 20 ml of solvent was pipetted onto the blotter. The mounted print was placed on three layers of Reemay and inserted into the first bag along with the solvent soaked blotter. All the air was squeezed out of the bag, and the bag was sealed. This sealed bag was then placed into a larger zip-lock bag. Again, the air squeezed out and the bag sealed. The function of the second bag was to limit any accidental solvent vapor in the event of leakage of the first bag.

Gore-Tex was used instead of Reemay during initial testing, but it quickly became apparent that a solvent with a low surface tension, like ethanol, could move through the Gore-Tex and come into contact with the print. The use of Gore-Tex was therefore discontinued.

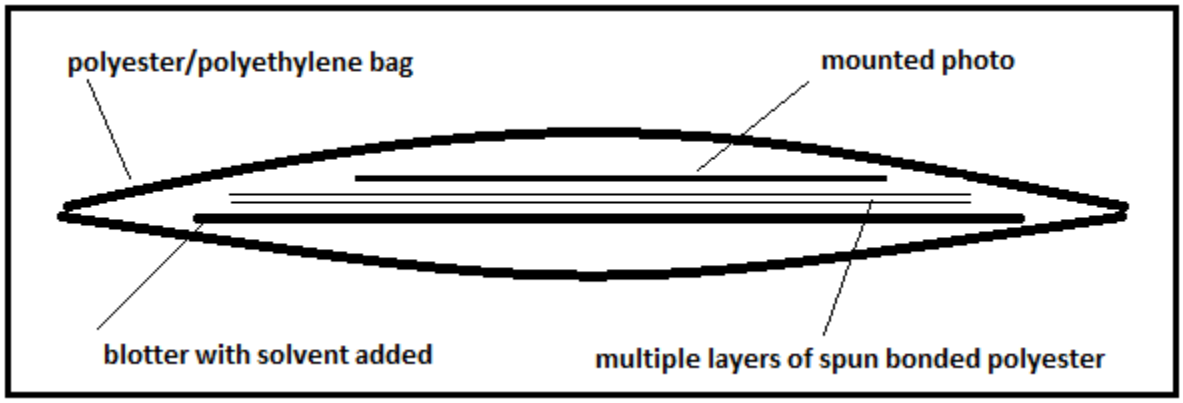


Fig. 14 Cross section diagram of the bag set up.

The polyethylene bags worked well for ethanol, but the plastic was softened and wrinkled by toluene, and the solvent could be smelled outside the enclosure.

Fig. 15 A toluene-softened polyethylene bag.

To overcome this issue a polyester bag was made using 4 mil Mylar, double folding the sides and securing them with double sided tape. The opening was then double folded and secured with a Velcro self adhesive hook and loop fastener.

The polyester bags were also tested using the thick solvent-soaked blotter and three layers of Reemay (which kept the photographs out of contact with the liquid solvent). This polyester-bag system worked well, with no softening/wrinkling of the bag, and no apparent solvent odor.

Fig. 16 The resealable polyester bag.

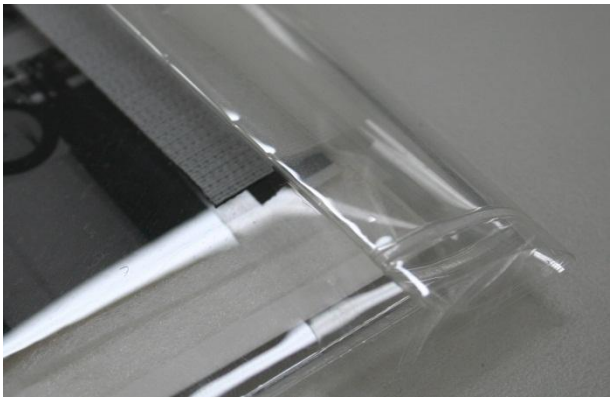


Fig. 17 Detail of the double fold-over and Velcro closure.

RESULTS

This solvent chamber technique was successful in separating most of the mounted samples. It was found that the synthetic adhesive based tissues released more readily than the shellac adhesive based tissues.

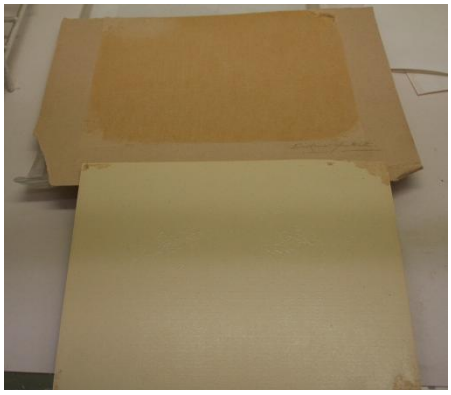
Tissue	Ethanol		Toluene	
	After 2 Hours	**After 6 Hours**	**After 2 Hours**	**After 4 Hours**
Kodak Type 1	Board released	Tissue did not release	----------	----------
Kodak Type 2	Board released	Tissue released	----------	----------
Seal MT5 Tissue	----------	----------	Board released	Tissue released
Bienfang Colormount	----------	----------	Board released	Tissue released
Elmers Foam Board	----------	----------	Board released	Tissue released
JAC Self Adhesive Paper	----------	----------	Board released	Tissue released

For example after two hours in the toluene vapor chamber, the test sample had released from the backboard. The tissue was still adhered to the print, so the object was returned to the bag. An additional 10 mL of toluene was added to the solvent soaked blotter in order to compensate for any solvent vapors lost while opening the chamber. After two more hours in the solvent chamber, the tissue could be removed from the back of the print and any residual adhesive swabbed off.

The historic sample prints were tested using the same polyester bags. The three black-and-white prints were put into ethanol vapor chambers and the three chromogenic prints into toluene vapor chambers.

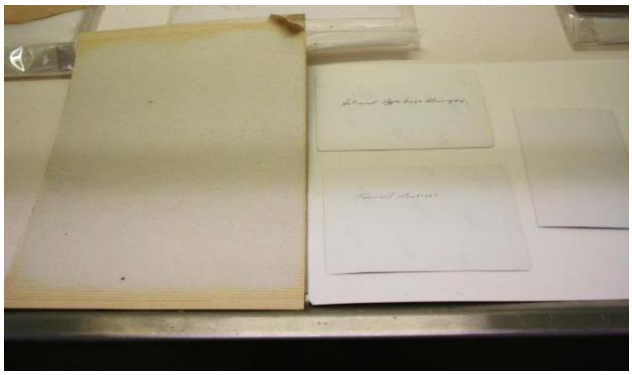
The silver gelatin print on a single, porous board and the chromogenic prints on the self-adhesive album page released very quickly, taking only thirty-five minutes to separate.

Historic silver gelatin print before treatment.



After thirty-five minutes in an ethanol vapor chamber.

A magnetic album page and chromogenic before treatment.

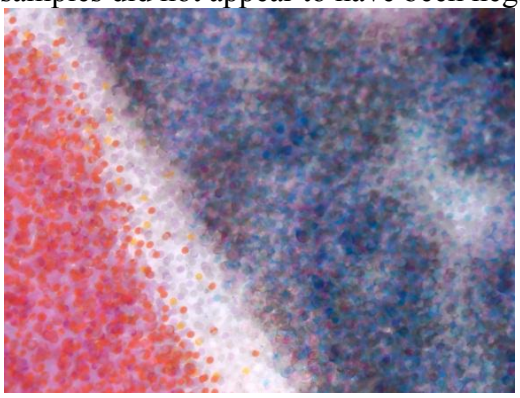


After thirty-five minutes in chamber a toluene vapor chamber.

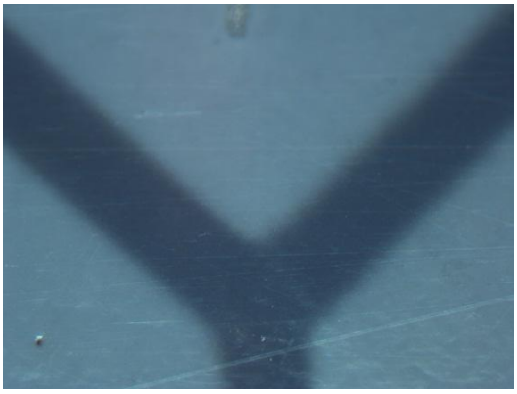
Fig. 18 Before treatment and after 35 minutes in a chamber of the appropriate solvent vapors.

Despite the success of these initial tests, the question arises as to what effect such prolonged exposure to solvent vapors may have on the image forming materials.

After treatment all of the samples were re-photographed under 30x stereo magnification. Most of the samples did not appear to have been negatively affected.



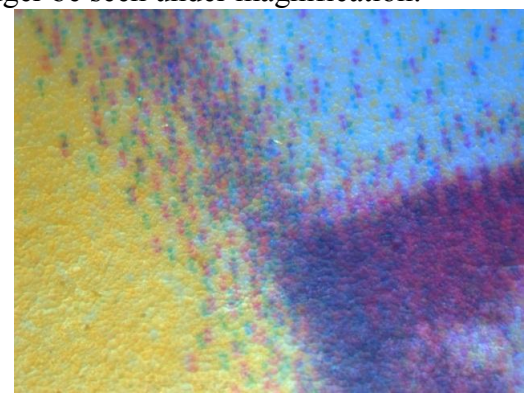
Detail: pigment inkjet print after 4 hours in a toluene vapor chamber.



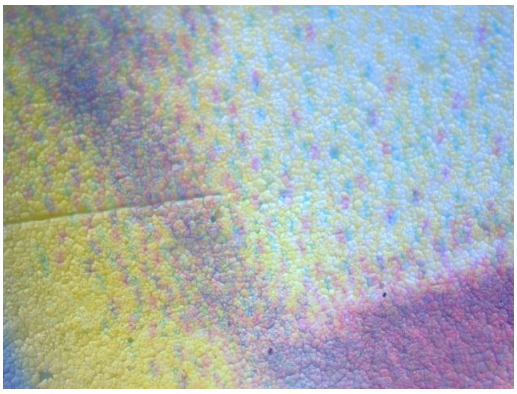
Detail: silver gelatin fiber based paper after 4 hours in a toluene vapor chamber.

Fig. 19 After treatment photo-documentation, photographed at 30x magnification.

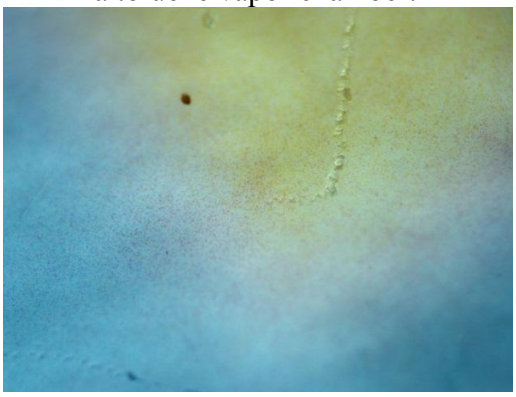
There were two exceptions: the dye-based inkjet prints (2012) and the Sakuracolor resin coated paper (1980s) were softened in appearance after four hours in a toluene vapor chamber. The dye drops appeared as though they had bled sideways, and the grain of the Sakuracolor print could no longer be seen under magnification.



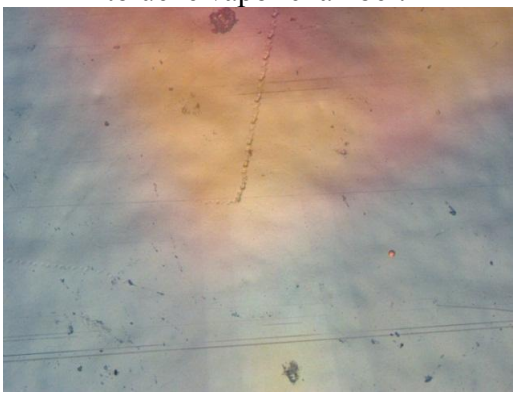
Detail: dye based inkjet print before 4 hours in a toluene vapor chamber.



Detail: dye based inkjet print after 4 hours in a toluene vapor chamber.



Detail: Sakuracolor before 4 hours in a toluene vapor chamber.



Detail: Sakuracolor after 4 hours in a toluene vapor chamber.

Fig. 20 After treatment photodocumentation, photographed at 30x magnification.

CONCLUSIONS

The goal of this project was to develop a vapor chamber technique to release photographs from dry mount tissue mounting systems using less of simple, inexpensive materials. The system designed as part of this preliminary testing does appear to have potential. For objects where immersion within a bath of organic solvent is problematic, a vapor chamber may be a more appropriate treatment option, and in these days of economic hardship, a compact and portable chamber using a minimal amount of solvent (40 mL) may be advantageous.

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