



Rochester Institute of Technology

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James M. Reilly, Director
716-475-2716

David M. Stone
Photographic Solutions, Inc.
7 Granston Way
Buzzards Bay, MA 02532


September 16, 1987

Dear David:

Enclosed is the report for the swab tests on PEC-12. I've used the soak data for the black-and-white material based on the assumption that if these materials can go through the eight hour soaking and show no significant changes, then twenty swabs of the cleaner should be no problem at all. I regret again, that it's later than I had intended.

Thank you for the project and we look forward to any other research that you may want done in the future, such as the multi-cleaner tests that we talked about on the phone. If you have any questions about this report, please call me at (716)-475-5199 or -2303.

Sincerely,


Douglas W. Nishimura
Research Associate

DWN/ms
enclosure



Society of
Photographic
Scientists &
Engineers

The Image Permanence Institute is jointly sponsored by Rochester Institute of Technology and the Society of Photographic Scientists and Engineers. It is a department of the School of Photographic Arts and Sciences, College of Graphic Arts and Photography.

STUDY OF PEC-12 FILM CLEANER FOR

PHOTOGRAPHIC SOLUTIONS, INC.

IMAGE PERMANENCE INSTITUTE
RIT CITY CENTER
50 WEST MAIN STREET
ROCHESTER, NY 14614-1274

1987 SEPTEMBER 16

E6 Control Strips

LOCATION	VISUAL	CONTROL	RED	CONTROL
1 YELLOW	-0.01	-0.01	-0.02	0.00
2 MAGENTA	-0.01	-0.02	-0.02	-0.02
3 CYAN	-0.02	-0.02	-0.06	-0.03
4 D-MIN	0.00	0.00	-0.01	-0.01
5 STEP5	-0.03	-0.01	-0.03	-0.02
6 D-MAX	-0.05	-0.04	-0.08	-0.06

E6 Control Strips

LOCATION	GREEN	CONTROL	BLUE	CONTROL
1 YELLOW	-0.02	0.00	0.03	0.24
2 MAGENTA	-0.01	0.00	0.05	0.05
3 CYAN	-0.02	0.00	0.02	0.04
4 D-MIN	0.00	0.00	0.02	0.03
5 STEP5	-0.03	0.00	0.01	0.05
6 D-MAX	-0.08	-0.02	0.02	0.20

In general, there were no density changes caused by incubation in the test samples that were not similarly reflected in the control samples except in the E6 control strip using the blue filter. The controls showed a shift towards yellow, particularly in the pure yellow patch that did not occur in the test samples. From experience, it seems likely that the E6 control performed unusually poorly. Regardless, the test strip did well.

CONCLUSIONS

With prudent use, PEC-12 does not show any major ill effects in the short term, based on visual changes, density changes and gross shrinkage, or in the long term, using accelerated aging, based on visual and density changes. Note that gross shrinkage measurements were not tested by accelerated aging since there is so little solvent absorption with a swab test that long term changes should be minimal.

AZO Paper Samples

STEP	VISUAL CONTROL		RED	CONTROL
1 D-MIN	-0.01	-0.01	0.00	0.00
2 STEP 4	-0.01	0.00	-0.01	0.00
3 STEP 7	0.00	-0.01	0.00	-0.01
4 D-MAX	0.01	-0.03	0.01	-0.01

AZO Paper Samples

STEP	GREEN CONTROL		BLUE	CONTROL
1 D-MIN	0.00	0.00	0.00	0.01
2 STEP 4	-0.02	0.01	-0.01	0.01
3 STEP 7	0.00	0.00	-0.02	-0.01
4 D-MAX	0.01	-0.01	-0.01	-0.04

Color

There were no detectable changes in density after each set of applications of PEC-12 in either color samples. Densities did vary, but randomly and within the noise of the densitometer. Density changes (before and after incubation) between the treated samples and the controls are tabled below.

C-41 Control Strips

LOCATION	VISUAL CONTROL		RED	CONTROL
1 COLOR	-0.02	-0.01	-0.01	0.00
2 D-MIN	-0.01	-0.01	0.00	0.00
3 STEP4	0.00	-0.02	0.00	-0.01
4 STEP8	-0.02	0.00	-0.02	-0.01
5 D-MAX	-0.01	-0.02	0.00	-0.05

C-41 Control Strips

LOCATION	GREEN CONTROL		BLUE	CONTROL
1 COLOR	-0.01	-0.04	-0.05	-0.02
2 D-MIN	-0.02	-0.03	0.03	0.00
3 STEP4	-0.01	-0.01	0.05	0.01
4 STEP8	-0.02	0.01	0.03	0.07
5 D-MAX	-0.03	0.01	-0.06	0.00

GROSS SHRINKAGE

After 20 applications of PEC-12, the Tri-X film base (cellulose triacetate) suffered a 0.04% shrinkage. This was not considered to be very significant although it was just enough to reverse the direction of curl at 50% RH. Polyester bases appear to be even less affected as there was no noticeable change in the curl of the Plus-X sheet film. Unfortunately a perforated sample of a polyester base was not available for testing.

DENSITY CHANGES

Black-and-White

There were no significant density changes found either before and after soaking, or before and after incubation. Changes after soaking were all within the noise levels of the densitometer. Tabled below are the results comparing the density differences (before and after incubation) between the test materials and the controls.

PLUS-X Samples

STEP	VISUAL	CONTROL	RED	CONTROL
1 D-MIN	0.02	0.01	0.02	0.01
2 STEP 4	0.00	0.01	0.00	0.01
3 STEP 7	-0.03	0.00	-0.04	-0.01
4 D-MAX	0.04	0.03	0.01	-0.01

PLUS-X Samples

STEP	GREEN	CONTROL	BLUE	CONTROL
1 D-MIN	0.01	0.02	0.01	-0.01
2 STEP 4	0.01	0.02	-0.01	0.00
3 STEP 7	-0.02	0.01	-0.02	-0.01
4 D-MAX	0.06	0.04	0.02	0.00

PROGRAM OBJECTIVES

Visual changes, density changes and gross shrinkage were evaluated using four different types of photographic materials to determine the effects of PEC-12 film cleaner under normal use conditions. The following materials were used:

- Density changes - Plus-X negative (sheet)
 - Azo print
 - C-41 control strip
 - E-6 control strip
- Gross shrinkage - Tri-X negative (35mm)

EXPERIMENTAL PROGRAM

GROSS SHRINKAGE

Gross shrinkage was evaluated by comparing film lengths before and after 20 applications of PEC-12 using a swab. The film sample was allowed to condition for 24 hours at 21°C and 50% RH. Measurements were taken using a sliding pin gage (ANSI PH1.32-1973).

DENSITY CHANGES

Density measurements were read on the test materials before application of PEC-12, after one application, two applications, five applications, ten applications, and twenty applications and after incubation on color samples. Samples were allowed to condition for 24 hours at 21°C and 50% RH before readings were taken. Density readings were also taken before and after incubation on control samples for comparison. Incubation conditions used were 60°C and 70% RH for one week. Black and white samples underwent a much more severe test in which the samples were soaked for eight hours instead of swabbed. All density measurements were taken using status A filters.

TEST RESULTS

VISUAL EVALUATION

There were no harmful effects of PEC-12 detected visually on any of the samples. Cellulose triacetate based films did show small changes in the direction of curl, although as noted under "Gross Shrinkage", these changes were not very significant. It was also observed that as stated on the bottle, application of too much PEC-12 resulted in a cloudy, somewhat greasy looking residue being left on the film, but again, as stated on the bottle, re-cleaning the film with a smaller amount of PEC-12 removed this residue.