

2 PROCESSING CYCLES

Processing Cycles for KODAK SM Chemicals

This section describes:

Processing cycles for KODAK FLEXICOLOR SM and EKTACOLOR SM Chemicals including information on—

- Time and temperature
- Replenishment rates
- Filtration
- Drying

Film Processing Cycle for KODAK FLEXICOLOR SM Chemicals

The cycle for processing color negative films is Process C-41SM. Process C-41SM is recommended for processing all Kodak color negative films.

Replenishment rates given are for a typical mix of Kodak color negative films in 35 mm or 24 mm size. Use the rates as starting points; adjust them as required according to your control-plot results.

Table 2-1 Processing Steps and Conditions for Process C-41SM

Solution/Step	Time min/sec	Temperature °C (°F)	Replenishment Rate for Versions 2.0* and 2.1		Comments
			mL/m 35 mm	mL/m 24 mm	
Developer	3:15 [†]	37.8 ± 0.15 (100 ± 0.25)	13.0		Recirculate and filter.
Part A			0.959	0.605	
Part B			0.120	0.076	
Part C			0.442	0.278	
Water			11.48	7.232	
Bleach	1:00 [‡]	38 ± 3 (100 ± 5)	3.51	2.53	Recirculate and filter. Aerate with oil-free air.
Fixer	2:00 [§]	38 ± 3 (100 ± 5)	15.1		Recirculate and filter.
Concentrate			7.55	5.44	
Water			7.55	5.44	
Final Rinse	1:00 [‡]	38 ± 3 (100 ± 5)	27.3		Recirculate and filter.
Concentrate			0.483	0.304	
Water			26.8	16.88	
Dry	As needed	40 to 68 (104 to 155)	—	—	Check filter regularly.

* Replenishment rate information is for Version 2.0 SM Processing Units F1 and for Version 2.1 SM Processing Units F2. Make sure the latest version of software installed on the film processor is enabled for "V2.0".

† Immersion time plus crossover time into the bleach tank. The developer time range is 3:15 ± 0.01.

‡ Bleach, fixer, and stabilizer times are the minimum times in solution, and do not include crossover times. If necessary, you can use longer times for these solutions. For best results, keep crossover times to less than fifteen seconds.

§ The fixer requires two countercurrent-flow tanks with equal time in both tanks; the stabilizer requires three countercurrent-flow tanks with equal time in each tank.

Replenishment Rates—The replenishment rates given are starting-point recommendations for a typical mix of Kodak color negative films.

Developer—If needed, adjust the developer replenishment rate according to your control plots; *keep the ratios of A, C and developer water constant*—i.e., increase or decrease all parts by the same percentage. Your developer replenishment rate depends on:

- amount of the various types of film processed
- film exposure
- other variables of the processing system

Bleach—To maintain chemical concentrations and pH level, the bleach replenishment rate must be high enough to compensate for developer carryover into the bleach. The bleach replenishment rate given is for typical carryover rates. If the carryover rate is higher, leuco-cyan dye and/or retained silver may occur. To offset the higher carryover, increase the replenishment rate. See your equipment manual for specifications and adjustments for squeegees or squeegee rollers.

Fixer—Use a replenishment rate of 17 mL/135-24 roll. The rate should be adequate to offset dilution from the carryover of the bleach.

Final Rinse—Use a replenishment rate of 30 mL/135-24 roll.

Bleach Aeration—The bleach requires oxygen to return the exhausted bleaching agent to a usable form. Aeration provides oxygen by pumping air bubbles through the bleach. Not enough aeration can cause leuco-cyan dye and retained-silver problems, particularly with a diluted or underreplenished bleach.

Final Rinse—The final rinse uses no stabilizing agent for safer handling. It also contains a wetting agent to provide uniform drying.

Filtration—Small amounts of insoluble materials in the water and solutions can stick to the film and minilab tank walls and rollers. This dirt can damage film. Install filters recommended by the manufacturer of your minilab to remove these materials. Usually, filters with a porosity of 10 to 30 microns are effective for solutions and wash water, and filters with a porosity of 15 microns are effective for incoming water supplies. You can use the following filter materials with processes that use FLEXICOLOR SM Chemicals:

- bleached cotton
- cellulose with phenolic resin binder
- fiber glass with phenolic resin binder
- polypropylene
- spun polypropylene
- viscose-activated carbon

Polypropylene is the most acceptable filter-core material and one of the least expensive. This material has no photographic effect, but the surfactants used to produce the polypropylene yarns may have an effect on your process. Therefore, monitor your process carefully when you first change filters. Replace filters regularly as part of routine maintenance.

Drying—Keep the film-drying area clean and free of dirt. If the dryer has a filter, check it regularly. Ideally, the drying temperature should not exceed 68°C (155°F). If the film has excessive curl, the ambient conditions are too dry; increase the relative humidity.

Low Utilization—Utilization is a way of expressing how much of your processor's capacity is used. If your processor utilization is low, oxidation and evaporation will affect the activity of your processing solutions. Follow the recommendations provided in KODAK Publication CIS-246, *Operating Minilabs at Low Levels of Utilization: Process C-41 and RA-4*.

Paper Processing Cycle for KODAK EKTACOLOR SM Chemicals

The cycle for processing KODAK EKTACOLOR Edge and ROYAL Papers in SM Minilabs is Process RA-2SM.

This process cycle is faster than the cycle for Process RA-4.

Table 2-2 Processing Steps and Conditions for Process RA-2SM

Solution/Step	Time* min:sec	Temperature °C (°F)	Replenishment Rate	Comments
			mL/m ² (mL/ft ²)	
Developer P1 Unit CAT 178 2713 Part A Part B Part C Water	0:25	40 ± 0.3 (104 ± 0.5)	64.6 (6.00)‡ 3.01 (0.28) 5.49 (0.51) 5.81 (0.54) 50.25 (4.67)	Recirculate and filter.
Developer V2.2 New P1 Unit Version 2.2 CAT 807 9782† Part A Part B (not used)§ Part C Water	0:25	40 ± 0.3 (104 ± 0.5)	59.3 (5.5)‡ 3.01 (0.28) 0.01 (0.01)§ 5.81 (0.54) 50.25 (4.67)	Recirculate and filter.
Bleach-Fix V2.1 Part A Part B	0:25	35 to 41 (95 to 104)	26.4 (2.45) 10.8 (1.00) 15.6 (1.45)	Recirculate and filter.
Stabilizer Concentrate Water	1:30¶	35 to 41 (95 to 104)	193.7 (18.00) 1.49 (0.138) 192.2 (17.86)	Recirculate and filter.
Dry	As needed	Not over 96 (205)	—	

* Immersion time plus crossover time to the next tank. The developer time range is 24 to 28 seconds. Minimum time for other solutions is minus one second from the normal times. Longer than normal times should have no adverse effects. For best results, a minimum of 22 seconds of solution time and crossover times of three seconds or less is recommended.

† **Please use up all older SM Processing Units P1 before converting to V 2.2.**

‡ The developer replenishment rate is a starting-point recommendation. You can adjust this rate as needed; *keep the ratios of A:B:C constant.*

§ EKTACOLOR SM Processing Unit P1, V 2.2 uses a single-part developer. Only the replenishment pumps for Part A and C are used. The Part B pump is not used. Although it does not matter what replenishment rate setting is used for the Part B replenishment pump, it is best to change this to the minimum setting the software will allow, 0.01.

¶ Four stabilizer tanks plumbed for countercurrent flow with each tank filtered.

Replenishment Rates—These rates are starting-point recommendations. Your replenishment rates will depend on:

- type of paper processed
- other variables of the processing system
- exposure level of the paper

Developer—If necessary, adjust the replenishment rate according to your control plots; *keep the ratios of Parts A, C, and Developer water constant.*

Bleach-Fix—The bleach-fix replenishment rates assume minimum carryover. If developer carryover is greater than normal, increase the bleach-fix replenishment rate to maintain the bleach-fix chemical balance and pH level; *keep the ratios of A:B constant.* Otherwise, problems such as retained silver may occur. See your equipment manual for specifications and adjustments for squeegee rollers.

Filtration—Processing solutions and wash water may contain some insoluble materials. If these materials aren't filtered out, they can stick to the paper, tank walls, rollers, and lines, and possibly damage the paper. Use filters recommended by the manufacturer of your minilab and change them regularly as a part of routine maintenance. Usually, filters with a porosity of 10 to 30 microns are effective for solutions and wash water, and filters with a porosity of 15 microns are effective for incoming water supplies. For more information about filters, see page 2-2.

Drying—The maximum drying temperature for KODAK EKTACOLOR Edge Paper and EKTACOLOR ROYAL Digital Paper is 93°C (200°F).

Low Utilization—Utilization is a way of expressing how much of your processor's capacity is used. If your processor utilization is low, oxidation and evaporation will affect the activity of your processing solutions. Follow the recommendations provided in KODAK Publication CIS-246, *Operating Minilabs at Low Levels of Utilization: Process C-41 and RA-4.*