

Operating Minilabs at Low Levels of Utilization: Process C-41 and Process RA-4



KODAK Chemicals designed for Processes C-41, C-41RA, and RA-4, cover a wide range of processor utilization. These solutions remain stable in processors when the processors are well maintained and production volumes do not fall to extremely low levels. However, a lab's business cycle sometimes include periods when low processing volumes can cause the quality of working tank solutions to degrade. During periods of very low utilization, special maintenance procedures needs to be followed, and specific paper-processing chemicals used, to keep the working tank solutions in the processor performing adequately.

The following sections describe film and paper processor options and guidelines for use during periods of low utilization. For more information on KODAK Chemicals, see KODAK Publication No. Z-100, *Using KODAK Chemicals in Minilabs*, or Publication No. Z-101, *Using KODAK SM Chemicals in SM Minilabs*, available at www.Kodak.com/go/photochemicals in the section on processing manuals.

PROCESS C-41, C-41RA, C-41B

In February 2009, KODAK FLEXICOLOR LU Developer Replenisher LORR will replace the current FLEXICOLOR Developer Replenisher LORR in 5–and 10-litre mix sizes. The new FLEXICOLOR LU Developer Replenisher LORR will be available on a stock-turnover basis. The features of this new product are:

- LU stands for **Low Utilization**. This product was designed to greatly extend the keeping of the mixed developer replenisher and developer tank solutions. It has double the keeping stability of the current Developer Replenisher LORR.
- Easy conversion: No new machine settings for this developer. To convert, just mix and replenish on top of existing solutions.
- The new LU Developer Replenisher LORR will also work in higher utilizations as well, making it your one, simple robust solution for your minilab processing needs.

When operating your processor under low-utilization conditions, the tank and replenisher solutions in your processor can be prone to the following problems:

- Oxidation of the developer tank solution is the primary concern. Oxidation can cause degradation of

the developing agent, resulting in low activity on your process monitoring, which can cause very low contrast in processed films. Often, this phenomena is so severe that it may be beyond the capacity of even digital printers to produce good quality prints from these films. Prints low in contrast and unsaturated in color are the result.

- All solutions can become overconcentrated.
- The final rinse tanks have increased potential for forming biological growth, which can create dirt problems on processed film

The developer is the primary concern in a minilab film processor operating in low utilization conditions, so we will define low utilization by how many rolls of film are necessary to process to keep the developer in proper activity. For the current FLEXICOLOR Developer Replenisher LORR, Table 1 below provides a utilization comparison in terms of rolls necessary to run per week versus developer tank size in litres. The green area of Table 1 represents normal utilization. The yellow and red areas are representative of low utilization.

Table 1

FLEXICOLOR Developer Replenisher LORR										
Films per Week	Tank Volume in Litres									
	3	5	8	10	15	20	25	30	40	50
300	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
200	Green	Green	Green	Green	Green	Yellow	Yellow	Red	Red	Red
150	Green	Green	Green	Green	Yellow	Yellow	Red	Red	Red	Red
100	Green	Green	Green	Yellow	Yellow	Red	Red	Red	Red	Red
75	Green	Green	Yellow	Yellow	Red	Red	Red	Red	Red	Red
50	Green	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red
40	Green	Yellow	Red	Red	Red	Red	Red	Red	Red	Red
30	Yellow	Red	Red	Red	Red	Red	Red	Red	Red	Red
20	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red

	Normal Utilization, no special procedures required
	Borderline Low utilization, may require special procedures
	Low Utilization, special procedures required

Compare Table 1 with Table 2 for the new FLEXICOLOR LU Developer Replenisher LORR. Notice how many less films it takes to stay in the green section for normal utilization. This is because FLEXICOLOR LU Developer Replenisher LORR is designed to require approximately half as many films processed to keep within the "Green Zone" of normal utilization.

Table 2

FLEXICOLOR LU Developer Replenisher LORR										
Films per Week	Tank Volume in Litres									
	3	5	8	10	15	20	25	30	40	50
300	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
200	Green	Green	Green	Green	Green	Green	Green	Green	Yellow	Yellow
150	Green	Green	Green	Green	Green	Green	Green	Yellow	Yellow	Red
100	Green	Green	Green	Green	Green	Yellow	Yellow	Red	Red	Red
75	Green	Green	Green	Green	Yellow	Yellow	Red	Red	Red	Red
50	Green	Green	Green	Yellow	Yellow	Red	Red	Red	Red	Red
40	Green	Green	Yellow	Yellow	Red	Red	Red	Red	Red	Red
30	Green	Green	Yellow	Red						
20	Green	Yellow	Red							

	Normal Utilization, no special procedures required
	Borderline Low utilization, special procedures may be required
	Low Utilization, special procedures required

Even if the utilization of your processor does fall within "Red Zone" of the above table, FLEXICOLOR LU Developer Replenisher LORR will require less special procedures and dumping of solutions to keep your processor in control.

If the number of rolls processed is in the "Red Zone," indicating low utilization, the following recommendations can help reduce the effects of low utilization:

- Top off all tank solutions with water at processor startup. If your processor has an auto-top-off system, use it to top off with water at start-up of the processor, but not at shutdown.
- Add a floating lid, or use material to act as a floating lid, in the developer replenisher tank of the processor.
- Use a smaller size of developer replenisher to mix the solution, and mix it more frequently. For example, if you are using the 10-litre size of FLEXICOLOR LU Developer Replenisher LORR, switch to the 5-litre size (CAT No. 823 1672).
- Replace the final rinse tank solutions at least once a month (more often if necessary) to keep them clean and free of biological growth.

Optional Procedures:

- Increase the replenishment rates for all solutions by 10 to 15 percent; do not increase them by more than this percentage.
- When a processor is operating with extremely low utilization, replace approximately 5 percent of the total volume of the developer tank solution each day at startup. Use properly mixed developer working tank solution (water, starter, and developer replenisher). For convenience, keep a supply of developer working tank solution mixed and stored in a sealed container for this purpose.

PROCESS RA-4

In Process RA-4, you have your choices of chemicals to use based on the utilization of the processor. But just as with film processing, if your paper processor is operating in low-utilization conditions, the tank and replenisher solutions in your processor may be prone to the following problems:

- Oxidation of the developer tank solution is the primary concern. Oxidation can cause low developer activity that can subsequently produce low D-max on processed paper. The D-max can get so severe that it may cause your digital printer not to calibrate. If your lab does calibrate, prints will appear low in contrast, unsaturated in color, with a light D-max that appears "cool" or has a blue bias in color.
- All solutions can become overconcentrated.
- The final stabilizer tanks can have increased potential for forming biological growth, which can create dirt problems on processed film. Also, the D-min, or stain on the paper, especially the yellow D-min, can increase by as much as 6 density points.

The developer solution is of primary concern in a minilab paper processor operating in low-utilization conditions. Low utilization can be defined by how many 4x6 prints it takes to process to keep the developer in proper activity, based on the size of the developer tank. If the number of prints processed is at or below these levels, the proper choice of chemicals used becomes important. Extra care may be needed to keep the tank solutions in good condition. Use Table 3, as a guideline for choosing which chemical products to use.

Table 3
 Number of 4 x 6-inch (10.2 x 15.2 cm) Prints Per Day

Tank Volume - Litres	125	250	375	500	750	1000	1250	1875	2500
5	Green	Green	Green	Green	Green	Green	Green	Green	Green
10	Red	Green	Green	Green	Green	Green	Green	Green	Green
15	Red	Green •	Green	Green	Green	Green	Green	Green	Green
20	Red	Red	Green •	Green	Green	Green	Green	Green	Green
25	Red	Red	Green •	Green •	Green	Green	Green	Green	Green
30	Red	Red	Red	Green •	Green	Green	Green	Green	Green
40	Red	Red	Red	Red	Green •	Green	Green	Green	Green
50	Red	Red	Red	Red	Green •	Green	Green	Green	Green

 Use EKTACOLOR PRIME SP Developer Replenisher LORR
 Use EKTACOLOR RA Developer Replenisher RT

• Periods of low utilization may require slight increases in replenishment rate

If Table 3 indicates that if the number of prints per tank size falls within the "Green Zone" of normal to mid-utilization, use the following chemicals:

- EKTACOLOR PRIME SP Developer Replenisher LORR
- EKTACOLOR PRIME SP Bleach-Fix Replenisher LORR
- EKTACOLOR PRIME Stabilizer and Replenisher LORR

If Table 3 indicates that if the number of prints per tank size falls within the "Red Zone" of low utilization, then use the following chemical products.

- EKTACOLOR Developer Replenisher RT
- EKTACOLOR Bleach-Fix Replenisher
- EKTACOLOR PRIME Stabilizer and Replenisher LORR

When operating your paper processor in low-utilization conditions, the following recommendations can help reduce the effects of low utilization:

- Top off all tank solutions with water at startup and shutdown of the processor.

- Replace the stabilizer tank solutions at least once a month, or as necessary, to keep them clean and free of biological growth. Increased yellow D-min is most commonly caused by the stabilizer. Replacing the stabilizer tank solution will usually correct the problem. In many cases, changing only the first tank or the first two tanks will be sufficient. If high yellow D-min persists, increase the replenishment rate for EKTACOLOR PRIME Stabilizer and Replenisher LORR from 195 mL/m² (18 mL/ft²) to 248 mL/m² (23 mL/ft²) until your processing volume increases.
- If the LD speed falls outside the lower action limit, increase all replenisher rates, especially developer, by 10 to 20 percent or more.
- *Optional:* Under conditions of extremely low utilization, you can use EKTACOLOR RA Developer Additive (CAT No. 122 4930), and EKTACOLOR RA Bleach-fix Additive (CAT No. 803 6832) in mixing the replenishers. This adds further protection from oxidation to keep your chemicals more stable. See directions for use in KODAK Publication Z-130, Section 4, available from the kodak.com website.

APPENDIX A MANAGING EVAPORATION

When water evaporates from processing solutions, the chemical components remain and the solutions become overconcentrated. Some evaporation will occur with any solution, and replenishers are designed to compensate for typical evaporation rates. However, if your processor operates at low production volume, evaporation can take place at a rate that is greater than the rate for which replenishers are designed.

Evaporation is more likely to be a problem when it occurs under these conditions:

- Tank solutions are up to temperature but no film or paper is being processed.
- Tank solutions are cooling down after shutdown. Because this down-time evaporation occurs after you shut down your processor, the level of processing solutions will be lower in the morning at startup.

The following procedures will help compensate for evaporation:

At daily start-up—With the recirculation system on, check the levels of the tank solutions. If the solution levels are not up to the top of the overflow tube, add water—at approximately operating temperature—to bring the solution up to the top of the overflow tube. If your processor has auto-top-off on the start-up prompts of your software, just push the “yes” key to top off with water.

At shutdown—With warm water, lightly squirt the top edges of the tank, the top of the rack, and the rollers and gears at the top of the rack to prevent buildup of dried chemicals. To avoid severely diluting the tank solutions, do not use too much water. Clean and rinse crossovers thoroughly to minimize chemical buildup.

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