

KODAK MICRODOL-X Developer



KODAK MICRODOL-X Developer is designed to produce lower graininess than other black-and-white film developers, with very little loss in film speed. For greater sharpness, but with a slight increase in graininess, you can use a 1:3 dilution of this developer.

Proper replenishment of MICRODOL-X Developer will increase the capacity and maintain process consistency without an increase in developer time. See "Replenishment" for instructions on how to replenish this developer.

Agitation

Proper agitation is very important for consistent and uniform results. Agitation helps remove the by-products of development from the surface of the film so that fresh developer can act on the exposed silver halide in the emulsion. Because agitation affects the rate of development, particularly in high-density areas, you can achieve consistent negative quality only if agitation is uniform over the whole surface of the film, and when the degree of agitation is similar for each film or batch of films.

Agitation should *always* consist of irregular or random movements that will not cause solution currents to flow over the film constantly in any one direction; these currents increase film density along their paths, causing nonuniformity.

Agitating Rolls in a Small Tank

The times given for small-tank processing are based on the following agitation procedure:

1. Fill the empty tank with developer.
2. Start the timer. In the dark, smoothly and rapidly lower the loaded reel(s) into the developer solution.
3. Quickly attach the top to the tank. Firmly tap the bottom of the tank against the work surface from a height of approximately 2.5 cm (1 inch) to dislodge air bubbles from the surface of the film. Air bubbles can interfere with development and produce low-density circles on the film.
4. Provide initial agitation of 2 to 7 cycles, in 5 to 15 seconds. For KODAK PROFESSIONAL T-MAX Films in invertible tanks, 5 to 7 cycles in 5 seconds are recommended. For an invertible tank, one cycle consists of rotating the tank upside down and then back to the upright position. For a noninvertible tank, one cycle consists of sliding the tank back and forth over a 25.4 cm (10-inch) distance. With tanks that have a handle for turning the reel, rotate the reel back and forth gently through about one-half turn at a rate of one cycle per second during the agitation intervals. Steps 2 through 4 will take approximately 7 to 20 seconds, depending on the type of tank.
5. End the initial agitation with a sharp tap of the bottom of the tank against the work surface to dislodge air bubbles from the film surface.
6. Let the tank sit for the remainder of the first 30 seconds.
7. After the first 30 seconds, agitate for 5 seconds at 30 second intervals. Agitation should consist of 2 to 5 cycles, depending on the contrast you need and the type of tank.

Agitating Short Rolls in a Large Tank

You can process several short rolls (1.5 metres [5 feet] or less) in a large tank. Wind each roll onto a spiral reel. Load the reels on a rack, in a basket, or on a spindle, and place the rack, basket, or spindle in the tank (typically a 3.8-litre [1-gallon] or a 13-litre [3½-gallon] tank). Many racks can hold up to 30 rolls of 35 mm film or 18 rolls of 120-size film. Use the following agitation procedure:

1. Start the timer. Lower the rack, basket, or spindle into the developer, and tap it quickly and sharply against the tank to dislodge air bubbles from the surface of the film. Air bubbles can interfere with development and produce low-density circles on the film.
2. Agitate the film continuously for the first 15 to 30 seconds by raising and lowering the rack, basket, or spindle approximately 1 cm (½ inch). Be sure to keep the reels in the solution. *Do not agitate the rack, basket, or spindle for the remainder of the first minute.*
3. Agitate once each minute (after the first minute) by lifting the rack, basket, or spindle completely out of the developer, tilting it approximately 30 degrees to drain it for 5 to 10 seconds, and reimmersing it. Alternate the direction of tilting the rack, basket, or spindle.

Agitating Sheet Film in Trays

Presoaking sheets in water yields more even development, especially when multiple sheets of film are processed together. Even a single sheet should be presoaked so that the rate of development will be the same as multiple sheets processed together.

To process a single sheet:

1. Fill a tray with water that is at the same temperature as the developer.
2. Immerse the film in the water, making sure it is totally covered with solution. Rock the tray occasionally for about 1 minute, then transfer the film to the developer.
3. Slip the film into the developer. Rock the tray immediately to make sure the film is covered with solution.
4. Agitate the film by first raising the left side of the tray about 3/4 inch (2 cm). Lower it smoothly, and then immediately raise and lower the side nearest to you. Next, raise and lower the right-hand side, then the near side again. This agitation cycle takes about 8 seconds.
5. Agitate continuously throughout the development time.
6. At the end of the development time, drain the sheet for a few seconds and transfer it to the stop bath. To avoid contaminating the developer with stop bath, use one hand for lifting the sheet from the developer and the other hand for placing it in the stop bath.

To process two to six sheets together:

1. Fill a tray with water that is at the same temperature as the developer.
2. Immerse the sheets one at a time, emulsion side up, in the tray of water. Make sure that each sheet is covered with water before inserting the next one. Agitate by moving the bottom sheet to the top of the stack every few seconds. Go through the stack twice. Be careful that the corners of the sheet you are handling do not scratch the sheet under it.
3. Take the bottom sheet out of the tray of water, drain it for a few seconds, and place it in the developer, emulsion side up. Make sure that the sheet is covered with developer. Transfer the rest of the sheets to the developer in the same way. Interleave the stack, from bottom to top, until development is complete.

Note: When you use interleaving agitation, go through the stack of sheets completely. Rotate the first sheet in the developer 180° from the rest of the stack so that the notch is at the opposite end. This identifies it as the first sheet; be sure that it is the first sheet you remove from each solution.

4. At the end of the development time, transfer the sheets to the stop bath one at a time in the order they were placed in the developer. Drain each sheet for the same time that the sheets were drained in Step 3 when placed in the developer. To avoid contaminating the developer with stop bath, use one hand for lifting the sheets from the developer and the other hand for placing them in the stop bath.

Agitating Sheet Film in a Large Tank

Be sure to separate the sheets by at least 1 cm (1/2 inch).

When you process films of different sizes together in the same tank, such as 8 x 10-inch and 4 x 5-inch films, separate the hangers containing the different-size films with a hanger loaded with an 8 x 10-inch sheet of acetate or scrap film to avoid uneven development or scratching of the larger sheets. This unevenness is caused by turbulence around the central frame of the multiple-film hanger during agitation. To agitate a sheet of film or a batch of sheet films in hangers in a tank, follow this procedure:

1. Start the timer. Lower the hangers as a unit into the developer. Tap the hangers sharply against the rim of the tank two or three times to dislodge air bubbles from the surface of the film. (Air bubbles can interfere with development and produce low-density circles on the film.)
2. Allow the hangers to remain undisturbed for the remainder of the first minute.
3. Lift all the hangers out of the solution and tilt them almost 90 degrees to the left. Reimmerse the hangers, lift them out again, and then tilt them almost 90 degrees to the right. Do this as quickly and smoothly as possible—in about 5 to 7 seconds.
4. After you reimmerse the hangers, check their spacing.
5. Repeat this agitation cycle once every minute during the development time.

Note: Each agitation cycle should take about 6 seconds. When you process large sheets of film (e.g., 8 x 10 inches), be careful not to dislodge them from the hangers by lifting them from the solution too quickly.

DEVELOPMENT

The development times in Kodak publications for black-and-white films are starting-point recommendations; for critical applications, run tests to determine the best development time. If your films are consistently too low in contrast, increase the development time slightly (10 to 15 percent); if they are too contrasty, decrease the development time slightly (10 to 15 percent).

If you use MICRODOL-X Developer diluted 1:3, dilute it just before you use it, and discard it after processing the batch of film. Before using the diluted developer, make certain that there are no air bubbles in the solution. If air is coming out of the solution and forming bubbles, let the solution stand until the bubbles dissipate.

STORING SOLUTIONS

Storing Solutions

Use the table below as a guide to the keeping properties of KODAK MICRODOL-X Developer. Store stock solutions in tightly closed bottles. Solutions in full bottles have a longer shelf life; partially filled bottles allow some oxidation of the solution.

Solution	Dilution	Storage Life			
		Stock Solution in Tightly Closed Bottle		Working Solution in	
		Full	Half-Filled	Tray	Large Tank*
MICRODOL-X MICRODOL-X Liquid	Full Strength	6 months	2 months	24 hours	1 month
MICRODOL-X MICRODOL-X Liquid	1:3†	NR	NR	NR	NR

* With floating lid.

† If you use MICRODOL-X Developer diluted 1:3, dilute it just before you use it, and discard it after processing one batch of film. Don't reuse or replenish this solution.

NR = Not recommended

Capacity

Capacity for MICRODOL-X Developer

Film Size	Number of Rolls or Sheets per Gallon of Developer	
	With Replenishment	Without Replenishment
120	60	16
220	30	8
135-24	80	21
135-36	60	16
8 x 10-inch sheets	60	16
4 x 5-inch sheets	240	64

Note: Discard developer after processing the equivalent of 4800 square inches of film per gallon.

Don't reuse or replenish diluted developer. When using MICRODOL-X Developer diluted 1:3, you can develop one 135-36 roll (80 square inches) in 473 mL (16 ounces) or two rolls together in 946 mL (one quart) of diluted developer.

If you process one 135-36 roll in a 237 mL (8-ounce) tank or two 135-36 rolls in a 473 mL (16-ounce) tank, increase the development time by 10 percent. This will compensate for the weakened developer and lower volume.

Replenishment

KODAK MICRODOL-X Replenisher has been discontinued. Customers who have been using this product may wish to try the following procedure that would allow them to continue using KODAK MICRODOL-X Developer in a replenished system.

This procedure provides a replenishing solution that should produce the same photographic results as MICRODOL-X Replenisher when used to replenish MICRODOL-X Developer. Although this solution does not exactly match the solution obtained when mixing the discontinued replenisher, a preliminary evaluation of this substitute replenishing solution has indicated that it works reasonably well. It has not, however, been extensively tested. Customers who wish to continue to replenish MICRODOL-X Developer are encouraged to run their own evaluation to determine whether it will meet their needs.

To make 3 U.S. quarts (2.84 litres) of replenishing solution:

1. Start with approximately 2 U.S. quarts (2 litres) of water at 90-100°F (32-38°C).
2. Add the contents of one packet of KODAK MICRODOL-X Developer (size to make one U.S. gallon—CAT No. 196 9724) with sufficient stirring to keep the chemicals suspended.
3. Add 24 grams of photographic grade Sodium Carbonate, monohydrate.
4. Mix until the components are dissolved.
5. Add water to bring the solution volume to 3.0 U.S. quarts (2.84 litres).
6. Mix until the solution is uniform.

The mixed replenishing solution should be stored in full tightly capped bottles until used. In partly full, tightly stoppered bottles, a storage life of about two months would be expected.

A starting point replenishment rate of 30 mL per roll of 135-36 exposure film (or equivalent) is suggested.

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MORE INFORMATION

Kodak has many publications to assist you with information on Kodak products, equipment, and materials.

The following publications are available from dealers who sell Kodak products, or you can contact Kodak in your country for more information.

E-103CF	<i>Chemicals for KODAK Black-and-White Films (Matrix)</i>
F-13	<i>KODAK High Speed Infrared Film</i>
F-4016	<i>KODAK PROFESSIONAL T-MAX Films</i>
F-4017	<i>KODAK PROFESSIONAL TRI-X Films</i>
F-4018	<i>KODAK PROFESSIONAL PLUS-X 125 Films</i>

For the latest version of technical support publications for KODAK PROFESSIONAL Products, visit Kodak on-line at:
<http://www.kodak.com/go/professional>

If you have questions about KODAK PROFESSIONAL Products, call Kodak.

In the U.S.A.:

1-800-242-2424, Ext. 19, Monday–Friday
9 a.m.–7 p.m. (Eastern time)

In Canada:

1-800-465-6325, Monday–Friday
8 a.m.–5 p.m. (Eastern time)

Note: The Kodak materials described in this publication for use with KODAK MICRODOL-X Developer are available from dealers who supply KODAK PROFESSIONAL Products. You can use other materials, but you may not obtain similar results.



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