*How to Use*

# KODAK MICRODOL-X DEVELOPER

*(Liquid volumes are given in the U.S. system)*

Kodak Microdol-X is an excellent fine-grain developer unmatched for its ability to produce low graininess coupled with maximum sharpness of image detail. It has very little tendency to sludge with use, is free from sludge when dissolved in hard water, and has no tendency to form scum on exhaustion, aeration, and replenishment. In addition to these advantages, Microdol-X produces a very low fog level even with forced development.

Kodak Microdol-X is particularly suited to the requirements of miniature film negatives, but its use may well be extended to the larger sizes of roll films, film packs, and sheet films whenever enlargements are contemplated.

Kodak Microdol-X is supplied in cartons of 4 packets, each to make 4 ounces; also, packages to make 1 quart, 1 gallon, and 5 gallons. Kodak Microdol-X Liquid Developer is supplied in a 1-quart bottle. Kodak Microdol-X Replenisher is supplied in packages to make 1 quart and 1 gallon.

## CHARACTERISTICS OF KODAK MICRODOL-X

Kodak Microdol-X is balanced to give the maximum reduction in graininess consistent with the maintenance of good emulsion speed. It not only produces lower graininess and higher acutance (sharpness) than normal developers, but it does so with very little loss in effective film speed.

In common with some other fine-grain developers, Kodak Microdol-X tends to produce an image of slightly brownish tone, which gives more printing contrast to the negative than is apparent to the eye.

## HOW TO USE KODAK MICRODOL-X

Tank development by the time-temperature method is recommended, since it can produce clean, evenly developed negatives and permits accurate control of development factors. It is the only practical method for handling 35mm films. Developing times can be reduced considerably if the solution is used at the preferred temperature, 75 F (24 C).

For negatives of optimum quality and minimum graininess, it is important to adhere strictly to the recommended times of development. Forced development increases graininess with any developer.

The rate of development increases with increased agitation which brings fresh solution to the film surface. Thus, with agitation every 30 seconds, as recommended for small tanks, about 10 percent less time is required than with agitation at one-minute intervals, as in large-tank processing.

Excessively vigorous agitation may cause increased development around the edges of the film, while development without agitation may result in mottle, streaks, and inferior graininess.

Recommended Developing Times (in minutes)* in Small Tanks

| Kodak Films | Microdol-X (stock solution) | | | | | Microdol-X (1:3) | | |
|---|---|---|---|---|---|---|---|---|
| | 65 F (18 C) | 68 F (20 C) | 70 F (21 C) | 72 F (22 C) | **75 F (24 C)** | 70 F (21 C) | 72 F (22 C) | **75 F (24 C)** |
| Verichrome Pan, roll | 11 | 9 | 8 | 7 | **6** | 13 | 12 | **10** |
| Plus-X Pan, 135 and roll | 11 | 9 | 8 | 7 | **6** | 14 | 13 | **11** |
| Plus-X Pan, sheet** | | 10 | | | **8** | NR | NR | **NR** |
| Plus-X Pan Professional, roll | 11 | 9 | 8 | 7 | **6** | 14 | 13 | **11** |
| Plus-X Portrait, roll | 11 | 9 | 8 | 7 | **6** | 14 | 13 | **11** |
| Royal-X Pan, roll | 11 | 9 | 8 | 7 | **6** | 14 | 13 | **11** |
| Panatomic-X, 135 and roll | 11 | 9 | 8 | 7 | **6** | 14 | 13 | **11** |
| Panatomic-X, sheet** | 18 | 16 | 15 | 14 | **12** | NR | NR | **23** |
| Tri-X Pan, 135 and roll | 13 | 11 | 10 | 9 | **8** | NR | NR | **15** |
| Infrared, 135 and roll | | 14 | | | **9** | | | **22** |
| Infrared, sheet** | | 10 | | | **7** | | | **17** |

*Agitation at 30-second intervals.
**Large tank, agitation at 1-minute intervals.
NR—Not recommended.

After development, rinse the film for about 30 seconds in an acid stop bath, such as Kodak Indicator Stop Bath or Kodak Stop Bath SB-1. Next, fix for twice the time required to clear in a good acid hardening fixing bath, such as Kodak Rapid Fixer, Kodafix Solution, or Kodak Fixer. Then wash thoroughly and dry.

It is important to keep all solutions, including the wash water, close to the same temperature. For example, when the developer solution is used at 75 F (24 C), the other solutions and wash water should be kept at approximately 73 to 77 F (23 to 25 C). Otherwise, a sudden change in temperature may cause a type of incipient reticulation which gives the appearance of graininess on enlargement.

It should be pointed out that low graininess alone does not assure fine quality in the print. In all photographic work, and particularly in the handling of miniature films, care must be taken at every stage to avoid blemishes, such as spots, dust, fingerprints, or scratches, which will mar the final result. The essence of good technique in photography is the exercise of care, cleanliness, and common sense from the time the film is loaded into the camera until the finished enlargement is mounted.

It should also be remembered that the apparent graininess in the final enlargement is affected by a number of things besides the actual graininess which is characteristic of the film-developer combination. Among the most important factors are the definition and quality of the negative image. If the negative has plenty of crisp and sharply defined detail, the graininess in the enlargement is much less noticeable than if the negative

image detail is soft or diffused. Thus, it is important to avoid any trace of camera motion or subject motion during exposure and to have the subject sharply focused. In order to reduce the effect of scattered light in the camera, it is also important to keep the camera lens clean, and desirable to use an effective lens hood.

On the other hand, lack of critically sharp enlarger focus or the use of diffusion devices in enlarging often tends to soften the graininess at the same time that it reduces definition in the enlargement.

## DILUTION OF KODAK MICRODOL-X FOR MAXIMUM DEFINITION

Kodak Microdol-X is designed to produce images of high definition by combining extremely fine grain and very high acutance (image sharpness). However, there may be occasions when still greater image sharpness is desired. This can be achieved by mixing one part of Microdol-X solution with three parts of water and increasing the time of development or developing at higher temperatures (up to 75 F) (24 C). All the films listed in the table on page 2 can be developed in Microdol-X, diluted 1:3, except Plus-X Pan Film (in sheets). The temperature of the stop bath, fixer, and wash water should be kept approximately the same as the developer temperature.

The diluted Microdol-X solution must be discarded after use. Its useful life is limited to immediate use, and it should not be stored or replenished.

## LIFE AND CAPACITY OF KODAK MICRODOL-X

In a completely full and tightly stoppered bottle, an unused, undiluted Kodak Microdol-X solution should remain in good condition for several months. In a partially full, tightly stoppered bottle or in a large tank with a floating cover, the safe storage life is about one month.

When used in a developing tank without replenishment, full-strength Kodak Microdol-X is capable of developing the following number of rolls of 36-exposure 35mm film or size 620 film, or the equivalent (80 square inches): one pint, 2 rolls; one quart, 4 rolls; one gallon, 16 rolls. To maintain uniformity of contrast when a developer is poured back and used over again, a progressive increase in development time is necessary. Under average conditions the time should be increased about 15 percent after each roll developed in a quart of developer or after each four rolls developed in a gallon. Thus, where the original developing time in a quart of developer is 6 minutes, add about 1 minute for each succeeding roll; 9 or 10 minutes, add 1½ minutes per roll; and 14 minutes, add 2 minutes per roll.

These figures apply to the total volume of solution being used. Thus, if one quart is mixed and used for 9 minutes in a developing tank holding only one pint and the developer is returned to the quart stock bottle after use and mixed with the remainder of the solution, the time increase should be 1½ minutes. On the other hand, if the pint of developer is stored and re-used separately, the time increase should be twice as much, or 3 minutes. When storing the used developer, it is important that the bottle be full and tightly sealed, since slow leakage of air may greatly reduce the life of the solution. It is false economy to risk spoiling an

irreplaceable negative by employing a used developer which has been stored for any considerable time in a partially filled bottle.

When diluted 1:3, Microdol-X should not be stored or replenished after use. One roll of film (80 square inches) can be developed in a pint of the diluted developer, and the solution should then be discarded.

If two rolls of film are processed simultaneously in a quart of diluted developer, no increase in processing time is required; if two rolls are processed successively in a quart of diluted developer, the time should be increased 15 percent for the second roll. This applies to equivalent area–volume relationships.

## REPLENISHMENT OF KODAK MICRODOL-X

When the development time is increased to compensate for exhaustion, it quickly becomes inconveniently long; therefore, it is usually better to replenish the developer to keep its activity from decreasing. With the use of Kodak Microdol-X Replenisher, the rate of development, film speed, and fine-grain characteristics can be maintained remarkably constant.

In large-tank work, the replenisher solution is added as needed to replace the volume of developer carried off by the films, thus keeping the liquid level constant in the tank. A given highlight density will normally be maintained throughout the developer life for a constant development time at a constant temperature, provided the replenisher is added at the rate of about ¾ ounce per roll, or 6 gallons per thousand rolls, of film developed.

When the replenisher is used with small volumes of developer, it should be added in proportion to the area of film developed, allowing approximately one ounce for each 80 square inches of film surface. This is approximately equivalent to one 36-exposure roll of 35mm film, one No. 620 roll, two No. 127 rolls, or one 2¼ by 3¼-inch film pack. The recommended procedure is as follows:

Store the developer in a completely filled and tightly stoppered bottle in order to reduce as far as possible the effect of aerial oxidation. If the bottle has a screw cap, be sure that it is screwed down tightly. Pour from the stock bottle the quantity of solution required by the developing tank. Then, while the developer solution is in the tank, add the proper quantity of Kodak Microdol-X Replenisher to the stock bottle. When development has been completed, pour the used developer back into the stock bottle. Keep the total volume constant by discarding any excess. To insure perfect cleanliness of the negatives, it may be desirable to filter the developer solution through absorbent cotton after each use, in order to remove any solid particles detached from the film.

With reasonably careful handling of the film and developing tank, this rate of replenishment should be sufficient to keep the stock bottle filled. If, however, more of the working solution is lost during development than is replaced by the replenisher, the difference should be made up with unused Kodak Microdol-X Developer.

While the life of a batch of developer is considerably lengthened by the use of Kodak Microdol-X Replenisher, it is not indefinitely prolonged. When Kodak Microdol-X is replenished as recommended, about 15 of the