

TOP SHELF

DOX - UNITED KINGDOM

FIDELITY

# KODAK HC-110 Developer and Developer Replenisher

KODAK HC-110 Developer has been formulated specifically for rapid processing of most black-and-white films.

It has a wide development latitude and retains a relatively low fog level when development is forced.

No loss in film speed and moderately fine grain combine to give sharp images with maximum shadow detail and a long density scale.

For convenience in handling and storage KODAK HC-110 Developer and Developer Replenisher have been prepared as highly concentrated liquids.

They are, therefore, ideal for commercial, industrial, graphic arts and press photography.

**Kodak**

This leaflet replaces the Eastman Kodak pamphlet J-13 referred to on the developer bottle.

### PACKAGE SIZES OF 'KODAK' HC-110 DEVELOPER

KODAK HC-110 Developer is supplied in two packings. The larger packing is labelled "To make 3½ US gallons" because it provides 3½ US gallons (or 13.2 litres) at Dilution A when the entire contents of the bottle are used. The smaller packing is labelled "To make 2 US gallons" because it provides 2 US gallons (or 7.6 litres) at Dilution A when the entire contents of the bottle are used. The volumes obtained at other dilution rates are shown in Tables 1a and 1b.

### MIXING HC-110 DEVELOPER

Because of the difficulties in measuring small quantities of viscous liquid, it is preferable to make up a stock solution and to dilute this to a working strength solution, as shown in Method A and Table 1a. Method B, using the concentrate directly should be used only for mixing 1 gallon or more.

#### Method A: Making a stock solution from the concentrate

1. Pour the contents of the bottle into a suitable container.
2. Rinse out the bottle with cold water and add this liquid to the concentrate.
3. Make up the solution with water to 3.3 litres for the 3½ US gallon size and to 1.9 litres for the 2 US gallon size, and stir thoroughly.
4. Dilute the stock solution as directed in Table 1a. below.

**TABLE 1a DILUTION RECOMMENDATIONS**

| Dilution | Stock plus water | Uses  | Amount of working dilution (in litres) made from packings labelled |           |
|----------|------------------|---|--|-----------|
|          |                  |   | 2 US gal   | 3½ US gal |
| A        | 1+3              | For sheet and roll films when short developing times are required.  | 7.6  | 13.2      |
| B        | 1+7              | For most 'Kodak' sheet and roll films. Permits longer developing times.   | 15.2   | 26.4      |
| C        | 1+4              | For continuous-tone sheet films employed in graphic arts reproduction.  | 9.5  | 16.5      |
| D        | 1+9              |   | 19   | 33        |
| E        | 1+11             |   | 22.8   | 39.6      |
| F        | 1+19             | For use with 'Kodak' Pan Masking Film 4570 (ESTAR Thick Base) in certain masking procedures used in colour printing and allied processes. | 38   | 66        |

#### Method B: Making a working solution from the concentrate.

1. Measure the required amount of concentrate carefully in a measuring cylinder and pour it into a suitable container.
2. Using the same measuring cylinder dilute the solution by adding the number of parts of water recommended for the dilution being mixed, as indicated in Table 1b below.

**TABLE 1b DILUTION RECOMMENDATIONS**

| Dilution | Concentrate plus water | Uses  | Amount of working dilution (in litres) made from packings labelled |           |
|----------|------------------------|---|--|-----------|
|          |                        |   | 2 US gal   | 3½ US gal |
| A        | 1+15                   | For sheet and roll films when short developing times are required.  | 7.6  | 13.2      |
| B        | 1+31                   | For most 'Kodak' sheet and roll films. Permits longer developing times.   | 15.2   | 26.4      |
| C        | 1+19                   | For continuous-tone sheet films employed in graphic arts reproduction.  | 9.5  | 16.5      |
| D        | 1+39                   |   | 19   | 33        |
| E        | 1+47                   |   | 22.8   | 39.6      |
| F        | 1+79                   | For use with 'Kodak' Pan Masking Film 4570 (ESTAR Thick Base) in certain masking procedures used in colour printing and allied processes. | 38   | 66        |

When using tanks which hold 3 UK gallons (13.6 litres) the following dilutions are convenient.

**TABLE 1c**

**DILUTION RECOMMENDATIONS FOR MAKING UP 3 UK GALLONS OF WORKING SOLUTION**

| Dilution | Stock   | Concentrate |
|----------|---------|-------------|
| A        | 3400 ml | 850 ml      |
| B        | 1700 ml | 425 ml      |
| C        | 2730 ml | 680 ml      |
| D        | 1360 ml | 340 ml      |
| E        | 1140 ml | 285 ml      |
| F        | 680 ml  | 170 ml      |

} Make up to 3 UK Gal with water

TABLE 2 DEVELOPING TIMES (in minutes) FOR AVERAGE NEGATIVES (C1=0.56)

| KODAK SHEET FILM | Film                      | Code | DILUTION A  |             |             |             |             |             | DILUTION B  |             |             |             |             |             |    |    |    |
|------------------|---------------------------|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----|----|----|
|                  |                           |      | DISH        |             |             | LARGE TANK  |             |             | DISH        |             |             | LARGE TANK  |             |             |    |    |    |
|                  |                           |      | 18°C (64°F) | 20°C (68°F) | 22°C (72°F) | 24°C (75°F) | 18°C (64°F) | 20°C (68°F) | 22°C (72°F) | 24°C (75°F) | 18°C (64°F) | 20°C (68°F) | 22°C (72°F) | 24°C (75°F) |    |    |    |
| KODAK SHEET FILM | 'Royal-X' Pan             | 4166 | 5           | 4½          | 4           | 3½          | 7           | 6           | 5           | 4½          | 8½          | 7           | 6½          | 11          | 10 | 8½ | 7½ |
|                  | 'Plus-X' Pan Professional | 4167 | 3½          | 2½          | 2           | 2           | 3½          | 3           | 2½          | 2½          | 6           | 5           | 4           | 8           | 7  | 6  | 5½ |
|                  | 'Tri-X' Ortho             | 4163 | NR          | NR          | NR          | NR          | NR          | NR          | NR          | NR          | NR          | NR          | NR          | 7           | 6  | 5  | 4½ |
|                  | 'Tri-X' Pan Professional  | 4164 | 3¼          | 2½          | 2¼          | 2           | 3           | 3           | 2½          | 2½          | 5           | 4½          | 4           | 7           | 6  | 5  | 4½ |
| KODAK SHEET FILM | 'Panatomic-X              | 5060 | 3           | 2½          | 2¼          | 2           | 3           | 3           | 2½          | 2¼          | 5           | 4½          | 3½          | 6           | 5  | 4¼ | 3½ |
|                  | 'Plus-X' Pan              | 5061 | 2½          | 2½          | 2           | 1½          | 3           | 2½          | 2¼          | 2           | 6           | 5           | 4           | 7           | 6  | 5  | 4½ |
|                  | 'Tri-X' Pan               | 5063 | 4¼          | 3½          | 3           | 2½          | 4           | 4           | 3½          | 3           | 6           | 5           | 4           | 7           | 6  | 4½ | 4  |
|                  | 'Verichrome' Pan          | 8041 | 2¼          | 2           | 1½          | 1½          | 2½          | 2¼          | 2           | 1½          | 4½          | 4           | 3           | 5           | 4½ | 4  | 3½ |
| KODAK SHEET FILM | 'Panatomic-X'             | 6040 | 3           | 2½          | 2¼          | 2           | 3½          | 3           | 2½          | 2¼          | 5           | 4½          | 3½          | 6           | 5  | 4¼ | 3½ |
|                  | 'Plus-X' Pan Professional | 6047 | 2½          | 2½          | 2           | 1½          | 3           | 2½          | 2¼          | 2           | 4           | 3½          | 3           | 4½          | 4  | 3½ | 3  |
|                  | 'Royal-X' Pan             | 6046 | 6           | 5           | 4½          | 4           | 7           | 6           | 5           | 4½          | 10          | 9           | 7½          | 11          | 10 | 8½ | 7½ |
|                  | 'Tri-X' Pan               | 6043 | 4¼          | 3½          | 3           | 2½          | 4           | 4           | 3½          | 3           | 6           | 5           | 4           | 7           | 6  | 4½ | 3½ |
| KODAK SHEET FILM | 'Tri-X' Pan Professional  | 6084 | 4¼          | 3½          | 3           | 2½          | 4           | 4           | 3½          | 3           | 6           | 5           | 4           | 7           | 6  | 4½ | 3½ |
|                  | 'Verichrome' Pan          | 6041 | 2¼          | 2           | 1½          | 1½          | 2½          | 2¼          | 2           | 4½          | 4           | 3½          | 3           | 5           | 4½ | 4  | 3½ |

**Agitation**

Sheet Films. When developing in a dish, agitation should be continuous. When developing on a hanger in a large tank, agitate once a minute. In order to ensure uniform processing avoid developing times of less than 5 minutes when using a large tank.

Roll and 35 mm Films. Agitate once every 30 seconds when developing roll or 35 mm films in a spiral developing tank. With large tank development of several reels in a basket agitate once a minute.

NR—not recommended

TABLE 3 DEVELOPING TIMES (in minutes)  
FOR 'KODAK' 2475 RECORDING FILM ('ESTAR-AH' BASE)  
IN SMALL TANK \*

|   | 20°C (68°F) | 24°C (75°F) | 29°C (84°F) | 35°C (95°F) |
|---|-------------|-------------|-------------|-------------|
| Dilution A<br>—average subject contrast | 5           | 3¼          | 2           | 1¼          |
| Dilution A<br>—flatly lit subjects      | 8           | 5           | 2¼          | 1¼          |
| Dilution B<br>—average subject contrast | 9           | 6           | 3           | 1¼          |
| Dilution B<br>—flatly lit subjects      | 16          | 10          | 6           | 3           |

\*These developing times apply only when KODAK 2475 Recording Film (ESTAR-AH Base) is used for low light level photography

DEVELOPING TIMES FOR KODAK CONTINUOUS-TONE GRAPHIC ARTS FILMS

Working dilutions C, D and E can be used instead of a solution of KODAK DK-50 Developer Powder for graphic arts and sheet films.

TABLE 4 CORRESPONDING DILUTIONS

| Dilution of KODAK DK-50 Developer Powder | Equivalent dilution of KODAK HC-110 Developer | Stock plus water | Concentrate plus water |
|--|---|------------------|------------------------|
| stock solution                           | C   | 1+4              | 1+19                   |
| 1+1                                      | D   | 1+9              | 1+39                   |
| 1+2                                      | E   | 1+11             | 1+47                   |

TABLE 5 DEVELOPING TIMES FOR 'KODAK' CONTINUOUS-TONE GRAPHIC ARTS FILMS.

| Film   | Application  | Dilution | Dish developing time<br>(in minutes at 20°C (68°F)<br>with continuous agitation |       |      |
|--|--|----------|---|-------|------|
|  |  |          | Red   | Green | Blue |
| KODAK<br>Gravure<br>Positive Film<br>4135 ('Estar'<br>Thick Base)              | Continuous-tone positives for photogravure and<br>photoengraving                           | C        |   | 4     |      |
|  | Pre-masks for two-stage masking  | C        |   | 3     |      |
| KODAK<br>Separation<br>Negative Film 4131<br>Type 1<br>(‘Estar’ Thick<br>Base) | GRAPHIC ARTS   |          | For exposure through<br>colour-separation filters                               |       |      |
|  | Colour-separation negatives from masked<br>colour transparencies                           | C        | 5   | 4     | 6    |
|  | Colour-separation negatives from reflection<br>copy (two-stage masking)                    | D        | 4½  | 4½    | 5½   |
|  | Colour-separation negatives from unmasked<br>colour transparencies                         | E        | 4   | 3½    | 4½   |
|  | Principal masks for colour transparencies  | E        | 2½  | 2½    | —    |
|  | COLOUR PRINTS  |          |   |       |      |
| KODAK<br>Pan Masking<br>Film 4570<br>(‘Estar’ Thick Base)                      | Colour-separation negatives from original<br>subjects or from masked colour transparencies | E        | 4   | 4     | 5    |
|  | Colour-separation negatives from unmasked<br>colour transparencies                         | D        | 3   | 3     | 4    |
|  | Colour-separation negatives from unmasked<br>colour transparencies                         | E        | 2½  | 2½    | 3    |
|  | Camera-back masking  | E        | 2½  | 2½    | 3    |
|  | Masks on transparencies (for cyan, magenta,<br>yellow and black printers)                  | E        | 3½  | 3½    | 3½   |
|  |  | D        | 3½  | 3½    | 3½   |

REPLENISHMENT

KODAK HC-110 Developer Replenisher is supplied in a 1 US gallon packing. The stock replenishment solution is made up as follows:

Dilute the contents of the bottle of replenisher concentrate with water to make 3.8 litres, using some of the water to rinse out the bottle. Stir thoroughly. Instructions for making the replenisher dilutions from the replenisher stock solution are given in Table 6.

TABLE 6 STOCK REPLENISHER SOLUTION DILUTIONS

| Working dilution | Replenisher stock solution plus water |
|------------------|---------------------------------------|
| A                | stock strength (no additional water)  |
| B                | 2 + 1                                 |
| C                | stock strength (no additional water)  |
| D                | 1 + 1                                 |
| E                | 8 + 11                                |
| F                | do not replenish                      |

To maintain constant developer activity, replenish the working solutions, with correctly diluted replenisher, at the rate of ¾ fluid ounce (22 ml.) per 80 square inches of film or 41 ml. per 1000 square centimetres. This is the replenishment rate for average negatives. If the majority of the subject matter leads to predominantly light or dark negatives, it may be necessary to decrease or increase the replenishment rate to compensate for the changes in developer exhaustion rate.

With an average drain period between the developer and the stop bath, the above replenishment rate will usually compensate for the carry-over of developer. However, if more solution is lost in the process than is replaced by replenishment, make up the loss by adding fresh developer of the appropriate dilution.

TABLE 7 APPROXIMATE NUMBER OF FILMS PER SQUARE METRE AND PER SQUARE FOOT

| Roll and 35 mm<br>Film Sizes | per m <sup>2</sup> | per ft <sup>2</sup> | Sheet Film Size | per m <sup>2</sup> | per ft <sup>2</sup> |
|------------------------------|--------------------|---------------------|-----------------|--------------------|---------------------|
| 126-12                       | 62                 | 6                   | 2¼ x 3¼         | 210                | 20                  |
| 126-20                       | 40                 | 4                   | 2½ x 3½         | 180                | 16                  |
| 127                          | 36                 | 3                   | 3¼ x 4¼         | 110                | 10                  |
| 135-20                       | 31                 | 3                   | 3½ x 5½         | 80                 | 8                   |
| 135-36                       | 18                 | 1½                  | 4 x 5           | 77                 | 7                   |
| 120; 620                     | 20                 | 2                   | 4¼ x 6¼         | 50                 | 5                   |
| 220                          | 10                 | 1                   | 6½ x 8½         | 28                 | 3                   |
| 116                          | 15                 | 1½                  | 8 x 10          | 19                 | 2                   |
| 828-8                        | 66                 | 6                   |                 |                    |                     |

When using dilutions A, B, C, D and E for tank development, replenished as above, the developer activity should be monitored using 'Kodak' Control Strips, 10-step (for professional black-and-white film). The solution can be kept in service for at least one month if these strips indicate proper developer activity.

If control strips are not used the following procedure should be followed as a guide to the exhaustion point of the working solution. Dilutions A, B, C, D and E can be replenished until a film area of approximately 133 square feet per UK gallon (2.75m<sup>2</sup> per litre) has been processed; or when the volume of added replenisher equals the original volume of solution in the tank; or after the developer has been used and replenished for two weeks. When the developer is not in use, protect it from oxidation with a floating lid.

Dilution F is generally used in a dish for developing masks. It should be used and discarded frequently. It should not be replenished.

**TABLE 8 CAPACITY OF WORKING DILUTIONS**

| Units         | Dilution | Dish       |           | Tank without replenishment |           | Tank with * replenishment |           |
|---------------|----------|------------|-----------|----------------------------|-----------|---------------------------|-----------|
|               |          | per UK gal | per litre | per UK gal                 | per litre | per UK gal                | per litre |
| Square feet   | A        | 13.3       | 2.9       | 26.7                       | 5.8       | 133                       | 29        |
|               | B        | 6.7        | 1.4       | 13.3                       | 2.9       | 133                       | 29        |
|               | C        | 10         | 2.2       | 20                         | 4.3       | 133                       | 29        |
|               | D        | 5          | 1.1       | 10                         | 2.2       | 133                       | 29        |
|               | E        | .3.3       | .7        | 6.7                        | 1.4       | 133                       | 29        |
|               | F        | 1.3        | .29       | —                          | —         | —                         | —         |
| Square metres | A        | 1.24       | .27       | 2.48                       | .54       | 12.4                      | 2.7       |
|               | B        | .62        | .135      | 1.24                       | .27       | 12.4                      | 2.7       |
|               | C        | .93        | .2        | 1.86                       | .4        | 12.4                      | 2.7       |
|               | D        | .46        | .1        | .93                        | .2        | 12.4                      | 2.7       |
|               | E        | .31        | .068      | .62                        | .135      | 12.4                      | 2.7       |
|               | F        | .12        | .027      | —                          | —         | —                         | —         |

\* Use and replenish for 1 month only

**TABLE 9 STORAGE LIFE OF UNUSED SOLUTIONS (in months)**

| Dilution          | Full, stoppered, glass bottle | ½ full, stoppered, glass bottle | Tank with floating lid |
|-------------------|-------------------------------|---------------------------------|------------------------|
| Stock solution    | 6                             | 2                               | —                      |
| Stock replenisher | 6                             | 2                               | —                      |
| A                 | 6                             | 2                               | 2                      |
| B                 | 3                             | 1                               | 1                      |
| C                 | 6                             | 2                               | 2                      |
| D                 | 3                             | 1                               | 1                      |
| E                 | 2                             | 1                               | 1                      |
| F                 | Do not store                  | Do not store                    | Do not store           |

Kodak, Royal-X, Plus-X, Tri-X, Panatomic-X, Verichrome, Estar-AH and Estar are trade marks.