Formulas for Process E-4 Solutions

Kodak discontinued its packaged chemicals for Process E-4 several years ago. The formulas for mixing the solutions from the individual chemicals are listed below. *Be sure to add the components in the order given in the formula.*

Note: Safe handling of any chemical is the responsibility of the user. If you don't have experience in mixing chemical formulas, obtain the aid of an experienced chemist. Handle photographic chemicals and processing solutions with care. Observe the safe-handling information and precautionary labels provided with each product and follow the instructions carefully.

Before beginning any mixing operation, read and be sure you understand the precautionary information on the product labels and in the Material Safety Data Sheet (MSDS) from the manufacturer of each chemical you use. You can obtain MSDS for Kodak products from **www.Kodak.com/go/MSDS**

For chemicals produced by others, contact the manufacturer.

PREHARDENER AND REPLENISHER

Water at 35 to 38°C (95 to 100°F)	850 mL
Succinaldehyde-bis-bisulfite (KODAK Hardening Agent HA2) Succinaldehyde Disodium Bisulfite	10.00 grams
Sodium sulfate, anhydrous (desiccated)	147.00 grams
Aminoacetic acid (KODAK Solubilizing Agent SA-2) (Glycine)	1.00 grams
Sodium bromide	2.00 grams
Sodium acetate, anhydrous	15.00 grams
Formaldehyde, 37% solution (12% methanol)	28.35 grams
Acetic acid, glacial	5.24 grams
STIR FOR 5 MINUTES; THEN ADD	
Water to make	1.00 litre

The pH or prehardener and replenisher is 4.80 ± 0.10 at 27°C (80.6°F).
The specific gravity is 1.136 ± 0.003 at 27°C (80.6°F).

Note: Fresh replenisher is colorless, but the solution turns dark purple after standing.This does not have any adverse photographic effects.

NEUTRALIZER AND REPLENISHER

Water at 21 to 27°C (70 to 80°F)	800 mL
Hydroxlamine sulfate (KODAK Neutralizing Agent NA-1)	12.60 grams
Sodium Bromide, anhydrous	11.90 grams
Acetic acid, glacial	7.00 grams
COOL TO 29°C (85°F); THEN ADD, WITH STIRRING	
Sodium Hydroxide, 50% solution	9.6 grams
COOL TO 49°C (120°F); THEN ADD	
Sodium sulfate, anhydrous	23.5 grams
KODAK Anti-Fog No. 6 (3-Methyl Benzothiazolium p-toluenesulfonate)	0.021 grams
Water to make	1.00 litre

The pH of neutralizer and replenisher is 5.25 ± 0.15 at 27°C (80.6°F).
The specific gravity is 1.043 ± 0.005 at 27°C (80.6°F).

FIRST DEVELOPER

Water at 32 to 38°C (90 to 100°F)	800 mL
Sodium sulfite, Anhydrous (desiccated)	39.00 grams
KODAK ELON Developing Agent	5.00 grams
Hydroquinone	5.90 grams
Quadrafos (Essex)	2.00 grams
Sodium carbonate, monohydrated	28.1 grams
Sodium bromide, anhydrous	1.50 grams
Potassium iodide (0.1% solution in water)	9.00 mL
Sodium thiocyanate, 51% solution	2.59 grams
Water to make	1.00 litre

The pH of first developer is 9.90 ± 0.10 at 27°C (80.6°F).
The specific gravity is 1.065 ± 0.003 at 27°C (80.6°F).

FIRST DEVELOPER REPLENISHER

Water at 32 to 38°C (90 to 100°F)	800 mL
Sodium sulfite	45.60 grams
KODAK ELON Developing Agent	5.30 grams
Hydroquinone	7.00 grams
Quadrafos (Essex)	2.00 grams
Sodium carbonate, monohydrated	29.30 grams
Sodium bromide	0.50 grams
Sodium hydroxide, 50% solution	3.44 grams
Sodium thiocyanate, 51% solution	2.70 grams
Water to make	1.00 litre

The pH of first developer replenisher is 10.04 ± 0.05 at 27°C (80.6°F).
The specific gravity is 1.067 ± 0.003 at 27°C (80.6°F).

STOP BATH AND REPLENISHER

Water at 21 to 27°C (70 to 80°F)	900 mL
Acetic acid, glacial	28.5 grams (30 mL)
Sodium hydroxide, granular	1.75 grams
Water to make	1.00 litre

The pH of stop bath is 3.5 ± 0.20 at 27°C (80.6°F).
The specific gravity is 1.000 ± 0.003 at 27°C (80.6°F).

COLOR DEVELOPER

Water at 21 to 27°C (70 to 80°F)	750 mL
Quadrafos (Essex)	5.0 grams
Benzyl alcohol, photograde, inhibited	3.25 grams
Sodium sulfite, anhydrous	7.60 grams
Potassium iodide 0.1% solution in water	28 mL
Sodium bromide, anhydrous	0.80 grams
Sodium hydroxide, 50% solution	4.1 grams
Ethylenediamine, 99%	3.0 grams
Tertiary butylamine borane, powder (KODAK Reversal Agent RA-1)	0.070 grams (TBAB)
Trisodium phosphate, dodecahydrated, crystals	36.0 grams
Citrazinic acid	1.35 grams
KODAK Color Developing Agent CD-3	10.5 grams
Water to make	1.00 litre

The pH of color developer is 11.25 ± 0.10 at 27°C (80.6°F).
The specific gravity is 1.035 ± 0.003 at 27°C (80.6°F).

COLOR DEVELOPER REPLENISHER

Water at 21 to 27°C (70 to 80°F)	800 mL
Quadrafos (Essex)	5.0 grams
Benzyl alcohol, photograde, inhibited	3.82 grams
Sodium sulfite, anhydrous	8.0 grams
Sodium hydroxide, 50% solution	6.8 grams
Ethylenediamine, 99%	3.06 grams
Tertiary butylamine borane, powder (KODAK Reversal Agent RA-1)	0.070 grams
Trisodium phosphate, dodecahydrated, crystals	37.60 grams
Citrazinic acid	1.60 grams
KODAK Color Developing Agent CD-3	11.5 grams
Water to make	1.00 litre

The pH of color developer replenisher is 11.68 ± 0.10 at 27°C (80.6°F).
The specific gravity is 1.037 ± 0.003 at 27°C (80.6°F).

BLEACH

Water at 32 to 38°C (90 to 100°F)	800 mL
Sodium thiocyanate, 51% solution	14.7 grams (11.0 mL)
Potassium ferricyanide, anhydrous	90.0 grams
Sodium bromide, anhydrous	22.5 grams
Disodium phosphate, anhydrous	19.5 grams
Monosodium phosphate, monohydrated	7.5 grams
Water to make	1.00 litre

The pH of bleach is 6.80 ± 0.15 at 27°C (80.6°F).
The specific gravity is 1.083 ± 0.003 at 27°C (80.6°F).

BLEACH REPLENISHER

Water at 32 to 38°C (90 to 100°F)	800 mL
Sodium thiocyanate, 51% solution	19.6 grams (14.9 mL)
Potassium ferricyanide, anhydrous	120.0 grams
Sodium bromide, anhydrous	30.0 grams
Disodium phosphate, anhydrous	26.0 grams
Monosodium phosphate, monohydrated	10.0 grams
Water to make	1.00 litre

The pH of bleach replenisher is 6.80 ± 0.10 at 27°C (80.6°F).
To make a working tank solution, dilute three parts replenisher with one part water.
The specific gravity is 1.112 ±.003 at 27°C (80.6°F).

FIXER AND REPLENISHER

Use KODAK Fixer, Process E-6

STABILIZER AND REPLENISHER

Water at 32 to 38°C (90 to 100°F)	800 mL
Formalin, 37.5% solution	6 mL
Renex 30	0.14 mL
Water to make	1.00 litre

The pH of stabilizer and replenisher is 7.25 ± 0.75 at 27°C (80.6°F).
The specific gravity is 1.000 ± 0.003 at 27°C (80.6°F).

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