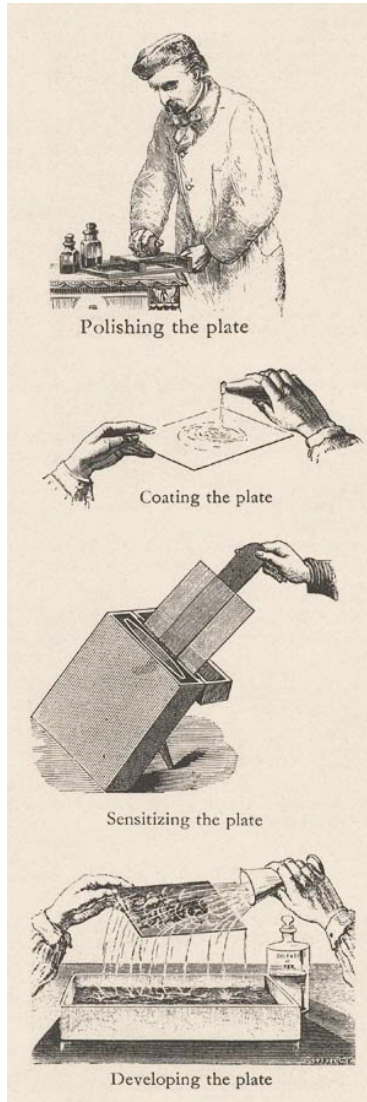


Film developer formulas



Ilford time/temperature chart

FILM DEVELOPMENT TIME/ TEMPERATURE COMPENSATION CHART

This chart is provided as a quick and easy guide for users who need to adjust development times for processing temperatures other than 20°C/68°F. It is a useful guide for all film/development combinations.

To use, find the row with the recommended or normally used development time for the film/developer combination at 20°C/68°F (the shaded column). Follow the row, left or right until it matches the column for the required temperature and read off the new development time.

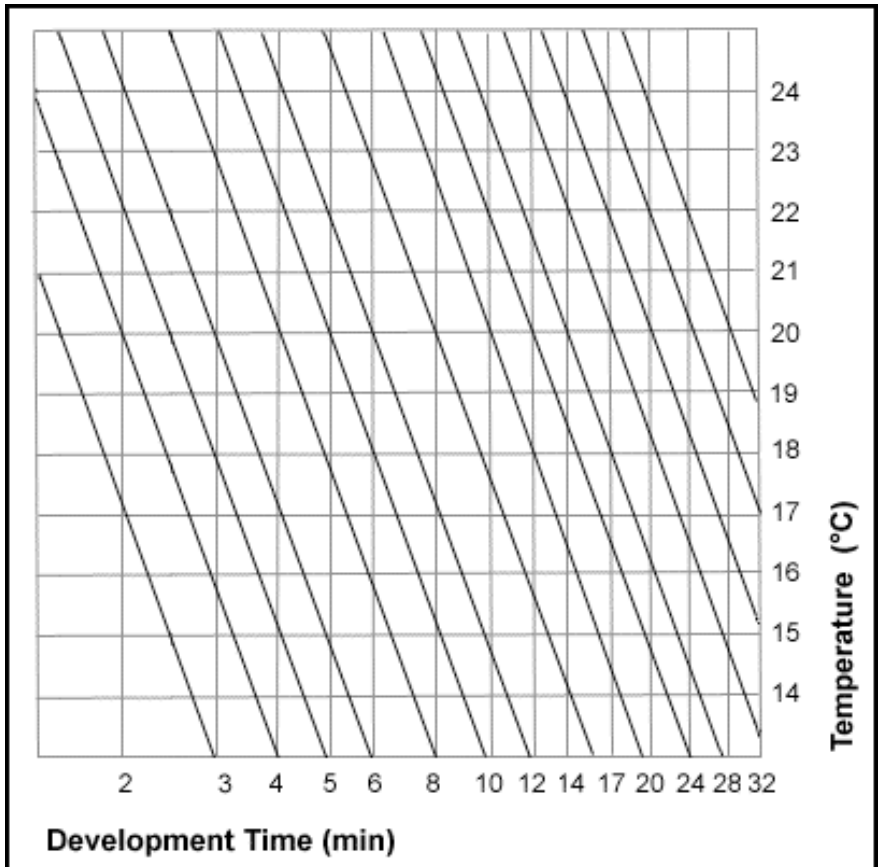
For example, if 8 minutes at 20°C/68°F is recommended, the compensated development time for 24°C/75°F will be 5 minutes and 30 seconds.

Please note that for ease of use development times have been rounded to the nearest 15 seconds.

DEVELOPMENT TIMES BELOW 5 MINUTES ARE NOT RECOMMENDED DUE TO THE RISK OF UNEVEN DEVELOPMENT.

18°C/64°F	19°C/66°F	20°C/68°F	21°C/70°F	22°C/72°F	24°C/75°F	25°C/77°F	27°C/80°F
5:00	4:30	4:00	3:30	3:15	2:30	-	-
5:30	5:00	4:30	4:00	3:45	3:00	-	-
6:00	5:30	5:00	4:30	4:00	3:15	-	-
6:30	6:00	5:30	5:00	4:30	3:30	-	-
7:15	6:30	6:00	5:30	5:00	4:00	3:45	-
8:00	7:15	6:30	6:00	5:15	4:30	4:00	3:30
8:45	7:45	7:00	6:30	5:45	5:00	4:30	3:45
9:15	8:15	7:30	6:45	6:00	5:15	4:45	4:00
9:45	8:45	8:00	7:15	6:30	5:30	5:00	4:15
10:30	9:30	8:30	7:45	7:00	6:00	5:30	4:00
11:15	10:00	9:00	8:00	7:15	6:15	5:45	5:00
11:45	10:30	9:30	8:30	7:45	6:30	6:00	5:15
12:30	11:15	10:00	9:00	8:00	7:00	6:15	5:30
13:00	11:45	10:30	9:30	8:30	7:15	6:30	5:45
13:45	12:15	11:00	10:00	9:00	7:30	6:45	6:00
14:15	12:45	11:30	10:30	9:15	8:00	7:15	6:15
14:45	13:15	12:00	10:45	9:45	8:15	7:30	6:30
15:15	13:45	12:30	11:15	10:00	8:45	8:00	7:00
15:00	14:30	13:00	11:45	10:30	9:00	8:15	7:00
16:45	15:00	14:00	12:30	11:15	9:45	9:00	7:45
17:15	15:30	14:30	13:00	11:45	10:00	9:00	7:45
17:45	16:00	14:30	13:00	11:45	10:00	9:00	7:45
18:30	16:45	15:00	13:30	12:15	10:30	9:30	8:00
19:15	17:15	15:30	14:00	12:45	10:45	9:45	8:15
19:45	17:45	16:00	14:30	13:00	11:00	10:00	8:30
20:30	18:30	16:30	14:45	13:30	11:30	10:15	8:45
21:00	19:00	17:00	15:15	13:45	11:45	10:30	9:00
21:45	19:30	17:30	15:45	14:15	12:00	10:45	9:15
22:15	20:00	18:00	16:15	14:30	12:30	11:15	9:45
22:45	20:30	18:30	16:45	15:00	12:45	11:30	9:45
23:30	21:00	19:00	17:15	15:30	13:15	12:00	10:15
24:15	21:45	19:30	17:30	16:00	13:30	12:15	10:30
24:45	22:15	20:00	18:00	16:15	13:45	12:30	10:45
25:15	22:45	20:30	18:30	16:45	14:15	12:45	11:00
25:00	23:00	21:00	19:00	17:00	14:30	13:00	11:15
25:30	23:30	21:30	19:30	17:30	14:30	13:00	11:30
26:30	23:45	22:00	19:45	17:45	15:00	13:30	11:30
27:15	24:30	22:30	20:15	18:15	15:30	14:00	12:00
28:15	25:00	23:00	20:45	18:45	16:00	14:30	12:00
28:45	25:30	23:30	21:00	19:00	16:15	14:45	12:45
29:45	26:45	24:00	21:45	19:30	16:45	15:00	13:00
30:15	27:15	24:30	22:00	19:45	17:00	15:15	13:00
30:45	27:45	25:00	22:30	20:15	17:15	15:30	13:15

Time-temperature chart



Rollo Pyro (ABC+)

Part A

Distilled water	400 ml
Metol	10 g
Sodium bisulfite	10 g
Ascorbic acid	5 g
Pyrogallol	75 g
Potassium bromide	0.75 g
EDTA tetrasodium	2 g
Distilled Water to make	500 ml

Part B

Distilled water	700 ml
Sodium metaborate	300 g
EDTA tetrasodium	5 g
Distilled water to make	1L

Film development times

film type	time	temp
dilute 2:8:100		

GSD-10

Distilled water	750ml
Sodium sulfite	50g
Sodium carbonate	75g
Glycin	10g
Distilled water to	1 liter

Similar to working strength Hubl Paste in composition. Fine grained and moderate highlight compensation. Excellent for stand developing.

Film development times

film type	time	temp
TMY (EI 800) 1:5	6m 30s	70°
Pan F+ 1:5	6m 30s	70°
Pan F+ 1:10 stand development	60m	70°

Hübl paste

Hot water (125F / 52C)	500ml
Sodium sulfite	165g
Glycin	135g
Potassium carbonate, crystalline	625g
water to	1000m

1. Heat up distilled water with sulfite up to 95-98C. Try to dissolve it completely.
 2. Then put glycin into this hot solution, stir well for a minute or so - glycin will go into this solution very well and completely. At this point you should have very heavy cream-like solution.
 3. Heat up to 95-98C again.
 4. Then add very small amount of potassium carbonate ad stir it - be careful carbon dioxide will form and you will have a lot of foam.... so stir it fast and prevent it from going out of the glass. Then add another small mount of carbonate and repeat he procedure until carbonate will not cause foam (it will happen after ~10% of carbonate added).
- Then put the rest of carbonate and stir until it dissolve. The solution will become more liquid.

Film development times

film type	time	temp
dilute 1:55	45m	??

Pyrocat – P

Stock A

Distilled Water at 120°F 750ml

Sodium Metabisulfite 10.0g

p-Aminophenol 5.0g

Pyrocatechin 50g

Potassium Iodide 1.0g

Water to 1000ml

The working solution of Pyrocat-P has a very distinctive purple/violet color, which should serve as a good test for mixing.

Film development times

film type	time	temp

PMK

Solution A

distilled water 375ml
metol 5g
sodium bisulfite 10g
pyrogalllic acid 50g
water to make 500ml

Solution B

distilled water 350ml
sodium metaborate 150g

water to make 500ml

dilute 1:2:100

Film development times

film type	time	temp

Grain enhancing developer

Metol	0.5g
Glycin	0.5g
Sodium Sulfite	4g
Sodium Carbonate	50g
Potassium Bromide	0.5g

Dissolve the sodium carbonate in 4 parts water (90 degrees) then add the rest of the chemicals. and water to make 1 liter. Use within 6 hrs.
Complete processing in the normal way.(?)

Film development times

film type	time	temp

510 Pyro

ascorbic acid	5g
pyrogallol	10g
phenidone	.25g
Triethanolamine	100ml

Film development times

film type	time	temp

ABC Pyro

A

Water	1 liter
Sod. Bisulfite	9.8 grams
KBr (10% Solution)	11 cc
Pyro	60 Grams

B

Sod Sulfite 105 grams

C

Sod Carbonate 80 grams

For use 1-1-1-7. Time depends on the film. We start inspecting Super XX at 8 minutes. For contrasty subjects use 1-1-1-15 and double the time.

Film development times

film type	time	temp

Acid Amidol

Water	1000 ml
Sodium sulfite (anhydrous)	16 g
Amidol	4 g
Sodium bisulfite	2 g
Potassium bromide	1 g

The sulfite must be dissolved first for the Amidol to dissolve into solution. The bisulfite is the acidifier and the bromide is the restrainer. Less bromide may be used down to 0.5g.

Another formula for older papers.

Notes

Paterson Acutol-S

Water	720 ml
Metol	3.5 g
Sodium sulfite (anhydrous)	100 g
Phenidone	0.1 g
Hydroquinone	2.5g g
Sodium bisulfite	0.5 g
Borax	2.5g
Sodium carbonate anhydrous	1.0g
Potassium Bromide	1.5g
Water to make 1 liter	

Full strength for portraits, 1:1 for landscapes and 1:3 for tabular grain films.

Notes

Adox Borax MQ

Water	750 ml
Metol	2 g
Sodium sulfite (anhydrous)	80 g
Hydroquinone	4 g
Borax	4 g
Potassium bromide	0.5 g
Water to make 1 liter	

Similar to D-76 with better sharpness. Development times should be increased by 10-20%

Adox Borax MQ Replenisher

20ml per roll	
Metol	3g
Sodium sulfite	80g
Hydroquinone	5g
Borax	18g
water to make 1 liter	

Notes

Atomal (ATM 49)

Calgon	1g
N-hydroxyethyl-o-aminophenol	6g
Pyrocatechin	10g
Hydroquinone	4g
Sodium sulfite anhydrous	100g
sodium carbonate anhydrous	25g
potassium bromide	1g
water to make	1 L

Film development times

film type	time	temp

Pyrocat HD

Part A

Water	375ml
Sodium Bisulfite	5g
Catechol	25g
Phenidone	1g
Potassium Bromide	0.5g
Water to make	500ml

Part B

Potassium Carbonate	400g
water	400ml

Film development times

film type	time	temp

FX-55

Part A

Potassium Carbonate: 20g

Sodium Bicarbonate: 1.5g

Sodium Sulphite: 25g

Sodium Metabisulphite: 12g

Water to 1,000ml and dilute 1:9 for the working solution. Before use add B to the diluted 1:9 diluted A solution to form the working strength developer.

Part B

Sodium L-ascorbate: 1.3g

Phenidone: 100mg (0.1g)

Again: B, consisting of

Sodium L-Ascorbate 1.3g

Phenidone 0.1g

ADD TO 1000 ML OF A, DILUTED 1:9

Film development times

film type	time	temp

Beutler

Part A

Water	750 ml
Metol	10 g
Sodium Sulfito (anhydrous)	50 g
Water to make	1L

Part B

Water	750 ml
Sodium Carbonate (anhydrous)	50 g
Water to make	1L

Mixing instructions: Add chemicals in specified sequence.
Dilution: 1+1+10

Film development times

film type	time	temp

FX-37

Water @ 125F	750 ml
Sodium Sulfit	70g
Phenidone	0.5g
Hydroquinone	5.0g
Sodium Carbonate	5.0g
Borax	2.5g
Potassium Bromide	0.5g
Benzotriazole (1%)	5ml
Water to make	1.0 liter

dilute 1:4

Film development times

film type	time	temp
TMZ 1:4	12	70
TX400 1:5	6	72

DS-12

High acutance film developer

Water	750 ml
Metol	0.4 g
Ascorbic Acid	1 g
Sodium Sulfite (anhydrous)	20 g
Salicylic Acid	0.2 g
Triethanolamine, 99%	2 ml
Sodium Carbonate (monohydrate*)	2 g
Water to make	1L

* = 1.7 g Sodium Carbonate (anhydrous)

Mixing instructions: Add chemicals in specified sequence.

Dilution: Stock, 2+1 (2 parts stock + 1 part water)

Starting point development time: 7 mins. (Stock)

Film development times

film type	time	temp

Kodak D-19

Water, about 50°C	500 ml
Metol	2 g
Sodium Sulfite (anhydrous)	90 g
Hydroquinone	8 g
Sodium Carbonate (monohydrate*)	52.5 g
Potassium Bromide	5 g
Water to make	1L

* = 45 g Sodium Carbonate (anhydrous)

Mixing instructions: Add chemicals in specified sequence.

Dilution: Use undiluted. Use between 65F/18C and 70F/21C for best results

Starting point development time: 6 mins.

Notes

Kodak D-8

Cold Water	750 ml
Sodium Sulfite (anhydrous)	90 g
Hydroquinone	45 g
Sodium Hydroxide	37.5 g
Potassium Bromide	30 g
Cold water to make	1L

Mixing instructions: Add chemicals in specified sequence. When mixing, due to the risk of heat reaction, dilute sodium hydroxide separately in a small amount of cold water then stir into mixture slowly in sequence.

Dilution: 2+1 (2 parts developer + 1 part water)

Starting point development time: 2 mins.

Notes

Paper developer formulas

Improved Solar Cameras.



PATENTED.
Feb. 24, 1857.
July 10, 1865.
Feb. 23, 1871.
May 26, 1874.
Aug. 4, 1874.
Sep. 18, 1877.



⚠ All persons are warned not to infringe the Letters Patents.

SEND FOR PRICE LIST.

D. A. WOODWARD, Maryland Institute,
Baltimore, Md.

Ansco 130

Water	750ml
Metol	2.2 grams
Sulfite	50. grams
Hydroquinone	11.0 grams
Sodium Carbonate	78 grams
Potassium Bromide	5.5 grams
Glycin	11.0 grams
water to make	1liter

Dilute 1:1 for normal use or 1:2 for softer working.

Notes

Anscoc 135 Warm Tone Developer

Water (125 deg F)	500 ml
Metol	1.6 grams
Sodium Sulfite (Anhydrous)	24.0 grams
Hydroquinone	6.6 grams
Sodium Carbonate (Anhydrous)	24.0 grams
Potassium Bromide (KBr)	2.8 grams
Water to make	1.0 liter

Note: For warmer tones, add more KBr

Notes

standard dilution 1:1

Agfa 108 hard paper developer

Warm Water 125 F or 52 C) -	750.0 ml
Elon -	5.0 grams
Sodium Sulfite, desiccated -	40.0 grams
Hydroquinone -	6.0 grams
Potassium Carbonate -	40.0 grams
Potassium Bromide -	2.0 grams
Add cold water to make -	1.0 liter

Use full strength; develop 1-2 minutes.

Notes

Defender 58D

Water 50 deg	500 ml
Sodium sulfite (anhydrous)	16 g
Chlorohydroquinone	4 g
Sodium carbonate	16 g
Potassium bromide	0.5 g
Cold water to make	1L

Dilute 1:1

if using sodium carbonate mono-hydrated, the amount is 18.7g

Another formula reputed to work well with old papers.

Notes

Edwal 111 - low fog

Water 50 deg	750 ml
Sodium sulfite (anhydrous)	80 g
Glycin	6 g
Chlorohydroquinone	15 g
Potassium carbonate	120 g
Potassium bromide	3 g
Cold water to make	1L

Mixing instructions: Add chemicals in specified sequence. When mixing, due to the risk of heat reaction, dilute sodium hydroxide separately in a small amount of cold water then stir into mixture slowly in sequence.

Dilution: 2+1 (2 parts developer + 1 part water)

Starting point development time: 2 mins.

This is supposed to work well with old and fogged papers.

Notes

Edwal 120 high contrast pyro paper dev

Stock A

water	500 ml
pyrocatechol	20 g
sodium sulfite	40 g
water to	1 L

Stock B

water	750 ml
Potassium Carbonate*	120 g
Potassium Bromide**	1 to 3 g
Water to	1 L

To use:

- 1 part A
- 2 part B
- 1 part water

*134 g Sodium Carbonate will result in a less warm tone

** more bromide will cool the tone - less will make a more neutral tone

Notes

Gevaert G 252 (cold tone developer)

Working Solution

Water (125 F or 52 C)	750.0 cc
Metol	2.5 grams
Sodium Sulfite (desiccated)	25 grams
Hydroquinone	6.0 grams
Sodium Carbonate (monohydrated)	45.0 grams
Potassium Bromide	0.5 gram
Add cold water to make	1.0 liter

Notes

Kodak D-72

Water (52°C)	750 ml
Metol	3 gm
Sodium Sulfite, anhydrous	45 gm
Hydroquinone	12 gm
Sodium Carbonate, monohydrate	80 gm
Potassium Bromide (10% solution)	20 ml
Water to make	1000 ml

D-72 is a universal print developer of normal contrast and neutral tone that is said to be very similar to Kodak Dektol. When mixing the stock solution add a pinch of sodium sulfite to the water before adding the metol to prevent the initial oxidation that otherwise would occur. Dilutions can range from 1:1 to 1:4 and print development is from 1 to 3 minutes.

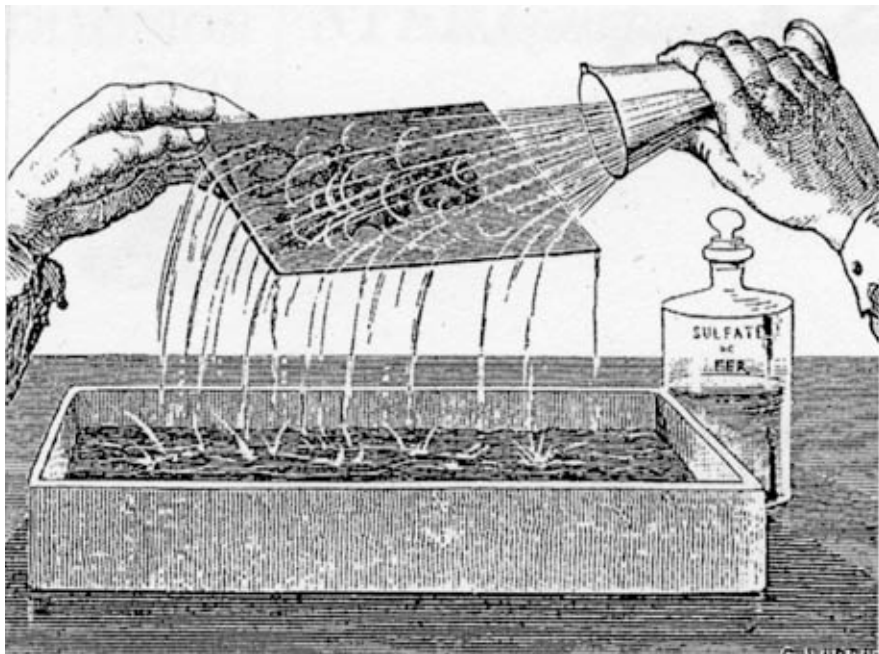
Notes

Amidol for chloride contact prints

Water	900ml	1300ml	2500ml
Sodium Sulfite	30g	45g	90g
Citric acid	3g	4.5g	9g
KBr (10% sol)	2ml	3.65ml	8ml
Amidol	8g	11g	20g
Water to make	1 liter	1.5 liter	3 liters

Notes

Toner, fixer and bleach formulas



Thiocarbamide Toner

Medium Brown tones with Oriental Seagull (LPD 1:4)

Bleach

7.5g potassium ferricyanide

7.5g potassium bromide

1 liter water

Reveloper

3g thiocarbamide

100g sodium carbonate

1 liter of water

Cooler Purple Brown tones MG IV

Bleach

20g potassium ferricyanide

10g potassium bromide

1 liter of water

Reveloper

3g thiocarbamide

9g sodium hydroxide

1 liter of water

Notes

Steiner bleach formula

Solution A

Sodium thiosulfate crystals 32 oz

Water 16 oz

(sugar as desired to slow down bleach)

Solution B

Sodium hydroxide (gloves!) 1 oz

Water 10 oz

Solution C

Potassium ferricyanide 3 oz

Water 10 oz

Working solution: 10 oz A + 0.75 oz B, then add 0.25oz C
Agitate working solution thoroughly. When the yellow fades, add a further 0.25 oz of C if required and re-immerses the print.

Notes

Nelson Gold Toner

(for warm tones on chloride papers)

Stock Solution No. 1:

Water (125° F)	4 liters
Sodium Thiosulfate (hypo)	960 g
Ammonium Persulfate	120 g

Dissolve the hypo completely before adding the ammonium persulfate. An equal amount of potassium persulfate may be substituted. If the bath does not turn milky, increase the temperature until it does. Cool the solution before proceeding.

Prepare the following solution and add it (including precipitate) slowly to the hypo-persulfate solution while stirring the latter rapidly. Both solutions must be cool.

Cold water	64 ml
Silver nitrate crystals	5.2 g
Sodium chloride (table salt)	5.2 g

Dissolve the silver nitrate completely before adding the salt. Do not use iodized salt.

Stock Solution No. 2:

Water	250 ml
Gold Chloride	1 g

Add 125 ml of Solution No. 2 slowly to Solution No.1 while stirring the latter rapidly. After mixing, the bath should not be used until it has become cool and has formed a sediment. Sediment formation may continue for several days or a week. Pour off the clear liquid for use.

Add the clear solution to a tray standing in a water bath and heat the solution to 110°. Dry prints should be soaked thoroughly in water before toning. Keep an untoned print at hand for comparison purposes.

Chloride papers should be toned between 100° and 110° Fahrenheit for 5 to 20 minutes. Most modern papers seem to require about 20 minutes.

After 50 8x10 inch prints have been toned, add 4 ml of Stock Solution No. 2 to the toner mixture.

Farmer's proportional reducer

Proportional reducer for overdeveloped negatives

Stock Solution A

Potassium ferricyanide	7.5 g
Water to make	1 liter

Stock Solution B

Sodium Thiosulfate (hypo)	200 g
Water to make	1 liter

For use, place negative in solution A for 1 to 5 minutes, then place in solution B for 5 minutes. Wash thoroughly.

Notes

Kodak F-24 non-hardening fixer

Water at 125° F	500ml
Sodium thiosulfate (hypo)	240g
Sodium sulfite	10g
Sodium bisulfite*	25g
Water to make	1 liter

* - substituting 22g of citric acid will eliminate a lot of the odor from this fixer

Use the fixer in two 5 minute baths. This formula is very useful for prints that will be toned in later steps.

Notes

Farmer's Reducer - overexposed negs

Cutting formula for overexposed negatives

Stock Solution A

Potassium ferricyanide	19 g
Water to make	250 ml

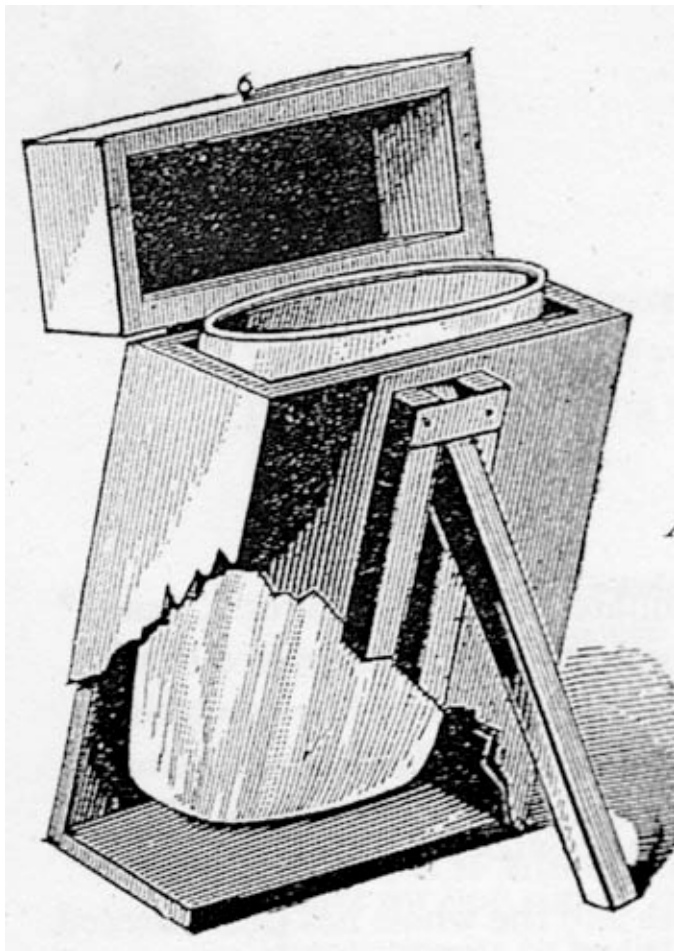
Stock Solution B

Sodium Thiosulfate (hypo)	240 g
Water to make	1 liter

For use, mix 30 ml. Solution A with 120 ml. Solution B and add water to make 1 liter. This is for cutting the density of negatives, but it also increases contrast.

Notes

Alt Process formulas



photographic formulary page added January 17, 2009

Ferric Oxalate

Ferric oxalate	27g
Oxalic acid	4g
EDTA tetrasodium	2g
Water to make	100ml

Palladium metal salts

Sodium palladium metal salt

water	92ml
PdCl	8.3g
NaCl	5.8g

Lithium palladium metal salt

water	92ml
PdCl	8.3g
LiCl	6.2g

Notes

Ware palladium process

Ammonium ferric oxalate sensitizer

Ammonium ferric oxalate	30g
33ml water to make	50ml

Ammonium Tetrachloropalladate *$NH_4_2[PdCl_4]$*

PdCl	6g
Ammonium chloride	3.6g
water to make	50ml

Ammonium Tetrachloroplatinate *$(NH_4)_2[PtCl_4]$*

10g in 36ml of water to make 40ml

Potassium Oxalate Developer Recipe

2 lbs of Pot Carb with 1.75 lbs oxalic acid to make 1 gallon of water. 1 lbs = 457g and 1 gallon = 3.8 l (top of my head but close enough as it is just POT OX).

Mix you Potassium carbonate into cool distilled water; about 1/2 your total volume.

SLOWLY add your Ox Acid as it WILL BUBBLE!!!!. Add to completion and top off with water to make final volume.

Notes

Collodion Recipes

Bob Szabo's 'More Reliable'

A:

100ml ether

220ml Non-flexible (N.F.) Collodion

B:

1g cadmium bromide

2ml distilled water – mix and dissolve
then add 0.5 g ammonium bromide

C:

2ml distilled water

dissolve 2g potassium bromide

D:

100ml Everclear (190 proof grain alcohol)

Add B to A, mix thoroughly. Then add C to D, and shake vigorously. Then combine C+D to A+B. Store in amber bottle.

This collodion is pretty much ready to go with no aging required. We mixed it up and used it 2 hours later on tintypes. Exposures were approximately 3 sec at f/5.6 in open shade with plenty of ground light.

Van Dyke Brown Solution

Solution A

Ferric Ammonium Citrate	9.0 gm
Distilled Water	33.0 ml

Solution B

Tartaric Acid	1.5 gm
Distilled Water	33.0 ml

Solution C

Silver Nitrate	3.8 gm
Distilled Water	33.0 ml

Notes
