

"BENIGN" Fe EDTA

30 g Ferric Sulfate
30 g di-Sodium EDTA
30 g Potassium Bromide
10 ml Sulfuric Acid (Conc.)
One litre water

or

30 g Ferric Sodium EDTA
30 g Potassium Bromide
30 g Sodium Bisulfate
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

One of the best "Cures for PBQ". Less hazardous to work with than the dreaded PBQ. Either version of the recipe gives the same result, the choice depending on the availability of the ingredients. Check market prices for the Ferric Sodium EDTA, it can be less expensive to make it in solution by combining Ferric Sulfate with di-Sodium EDTA. Can use Sulfuric Acid or Sodium Bisulfate in either recipe as a buffer.

Shelf life: Leaving the solution exposed to air (uncovered tray) will extend the lifetime of the oxidizer. It has run its useful course when it takes very long to completely clear, like over 5 minutes.

PYROCHROME BLEACH ('CHROME BLEACH)

4 g Potassium Dichromate
4mL Sulfuric Acid (or 12 g Sodium Bisulfate)
One litre water

Bleaching time: Time it takes to clear plus 15 seconds, not to exceed 2 minutes.

Temperature: 20C Agitation: Constant

Distilled water is recommended otherwise white scum may collect in the emulsion. First hologram in the bath may take a long time to clear. When clearing time exceeds two minutes the bath is becoming saturated with silver salts and needs to be replaced. Hanging the plate vertically in a tank or with emulsion side down in a tray during bleaching speeds the exit of the soluble silver salts from the emulsion.

Shelf life: This solution stores indefinitely, but should be dumped when it takes longer than a couple of minutes to clear. Ilford SP679C is a packaged, concentrated version of this bleach.

CWPBQ2

15 g Citric Acid
50 g Potassium Bromide
2 g p-Benzoquinone (PBQ) added just before use.
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

Introduced with CWC2 developer. If you do not have good ventilation or a respirator, use one of the other rehalogenating formulas as the PBQ has a rather pungent odor. But if you take the proper precautions you will be rewarded.

Primary recommendation for bleaching the discontinued Agfa Holotest 8E56HD and 8E75HD films and plates. as there is no emulsion shrinkage, thanks to the tanning effect of the PBQ. Works well on Slavich PFG-01 plates and Fuji films. Also useful for processing Bulgarian Academy of Sciences HP-490 Holographic plates.

Shelf life: The acidified salt solution alone will last indefinitely; with PBQ added the bleach will need to be discarded at the end of the day. Keeping a lid on the developing tank or tray will extend the working life.

PYROCHROME BLEACH ('CHROME BLEACH)

4 g Potassium Dichromate
4mL Sulfuric Acid (or 12 g Sodium Bisulfate)
One litre water

Bleaching time: Time it takes to clear plus 15 seconds, not to exceed 2 minutes.

Temperature: 20C Agitation: Constant

Distilled water is recommended otherwise white scum may collect in the emulsion. First hologram in the bath may take a long time to clear. When clearing time exceeds two minutes the bath is becoming saturated with silver salts and needs to be replaced. Hanging the plate vertically in a tank or with emulsion side down in a tray during bleaching speeds the exit of the soluble silver salts from the emulsion.

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ORIGINAL FERRIC NITRATE FORMULA

20 g Glycerol
500 ml Deionized Water
500 ml Isopropyl Alcohol
300 mg Phenosafranine
150 g Ferric Nitrate
33 g Potassium Bromide
One litre water

Dilute 1 to 4 with water before use.

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

For rehalogenation after fixing. Hans Bjelkhagen prefers this over the simpler GP 431 formulation for pulsed masters developed in Neofin Blau diluted 1:1.

Shelf life: This stock solution lasts indefinitely, working solution about one week.

GP 431

300 mg Phenosafranine
150 g Ferric Nitrate
33 g Potassium Bromide
One litre water

Dilute 1 to 4 with water before use.

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

For rehalogenation after fixing. Hans Bjelkhagen prefers this over the simpler GP 431 formulation for pulsed masters developed in Neofin Blau diluted 1:1.

Shelf life: This stock solution lasts indefinitely, working solution about one week.

GP 432

50 g Potassium Bromide
1.5 g Boric Acid
2 g p-Benzoquinone added just before use.
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

Shelf life: Not long with the PBQ added. This bleach never seemed to work for me, on Agfa Holotest 8E75HD. But it works quite well on Agfa Holotest 8E56HD. Go figure.

GP 433

30 g Potassium Iodide
3 g Boric Acid
2 g p-Benzoquinone added just before use.
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

Shelf life: Probably not too long after the PBQ is added.

This bleach is supposed to upshift the replay color to longer wavelength, although I've never seen it work. Another one not to bother with in my book.

ILFORD EDTA

100 g Ferric Sodium-EDTA
10 g Potassium Bromide
One litre water

Bleaching time: A bleach that does not seem to clear the plate at all. Don't even bother. It seems that they left out the necessary acid.

PYROCHROME BLEACH ('CHROME BLEACH)

4 g Potassium Dichromate
4mL Sulfuric Acid (or 12 g Sodium Bisulfate)
One litre water

Bleaching time: Time it takes to clear plus 15 seconds, not to exceed 2 minutes.

Temperature: 20C Agitation: Constant

Distilled water is recommended otherwise white scum may collect in the emulsion. First hologram in the bath may take a long time to clear. When clearing time exceeds two minutes the bath is becoming saturated with silver salts and needs to be replaced. Hanging the plate vertically in a tank or with emulsion side down in a tray during bleaching speeds the exit of the soluble silver salts from the emulsion.

Shelf life: This solution stores indefinitely, but should be dumped when it takes longer than a couple of minutes to clear. Ilford SP679C is a packaged, concentrated version of this bleach.

PHOTOGRAPHERS' FORMULARY JD-3 KIT BLEACH

17 g Copper Sulfate
2 g Succinic Acid
55 g Potassium Bromide
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

A diluted version of Jeff Blyth's original Copper Sulfate Bleach. Succinic Acid is a dry powder to save on hazardous shipping charges of liquid acetic acid.

Shelf life: Pleasant blue-green color when mixed, dirty green when exhausted. Not prone to oxidation like PBQ.

PHOTOGRAPHERS' FORMULARY JD-4 KIT BLEACH

35 g Copper Sulfate
5 g Sodium Bisulfate
100 g Potassium Bromide
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

More or less the same as the original Jeff Blyth's original Copper Sulfate Bleach, again subbing a dry powder to save on hazardous shipping charges of liquid acetic acid.

Shelf life: Pleasant blue-green color when mixed, dirty green when exhausted. Not prone to oxidation like PBQ.

JEFF BLYTH'S COPPER SULFATE

35 g Copper Sulfate
10 ml Acetic Acid
110 g Potassium Bromide
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

One of the best "Cures for PBQ". Identical results to the PBQ, less costly than Fe EDTA. Unfortunately the original article did not disclose the strength of the Acetic Acid, whether it should be Glacial or 28%. It seems to work fine with the 28%.

Shelf life: Pleasant blue-green color when mixed, dirty green when exhausted. Not prone to oxidation like PBQ.

KODAK R-9

9.5 g Potassium Dichromate
8 mL Sulfuric Acid (or 24 g Sodium Bisulfate)
One litre water

Bleaching time: Time it takes to clear plus 15 seconds, not to exceed 2 minutes.

Temperature: 20C Agitation: Constant

Distilled water is recommended otherwise white scum may collect in the emulsion. First hologram in the bath may take a long time to clear. When clearing time exceeds two minutes the bath is becoming saturated with silver salts and needs to be replaced. Hanging the plate vertically in a tank or with emulsion side down in a tray during bleaching speeds the exit of the soluble silver salts from the emulsion.

This was Kodak's bleach for reversal processing of direct positive black and white transparency or movie films.

Shelf life: This solution stores indefinitely, should be dumped when it takes longer than a couple of minutes to clear.

KODAK R-10 BLEACH

Part A:

20 g Ammonium Dichromate
14 mL Sulfuric Acid (or 42 g Sodium Bisulfate)
One litre water

Part B:

45 g Sodium Chloride
One litre water

Mix 1 part Solution A with 1 Part Solution B with 10 parts water before use.

Bleaching time: Time it takes to clear plus 15 seconds, not to exceed 2 minutes.

Temperature: 20C Agitation: Constant

Was used in the dawning of the age of wavefront reconstruction, see sources below, hardly ever used nowadays, but a [bleach attributed to Dr. Tung Jeong](#) is a variation of it, and one of my go-to bleaches for either exact laser wavelength reconstruction of reflection holograms, or to generate surface relief effects.

Shelf life: This solution stores indefinitely, but should be dumped when it takes longer than a couple of minutes to clear.

KODAK S-13 STAIN REMOVER

Part A:

2.5 g Potassium Permanganate
8 mL Sulfuric Acid or 24 g Sodium Bisulfate
One litre water

Part B:

10 g Sodium Bisulfite
One litre water

Don't mix the two together. Immerse the plate for one minute in Part A, then one minute in Part B, followed by a five to ten minute wash. The sodium bisulfite gives off quite a strong effluvia, respirators mandatory. It will remove the pyrogallol or pyrocatechol stain from holograms, or most any stain in the holographic darkroom's trays.

These baths can also be used as a reversal bleach, but they are temperamental.

Bleaching time: One and a half times the time it takes to clear if used as a reversal bleach.

Temperature: 20C Agitation: Intermittent

Shelf life: This stock solution lasts practically indefinitely.

MERCURIC CHLORIDE

20 g Mercuric Chloride
20 g Potassium Bromide
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

Although some people swear by it in a develop-wash-fix-wash-bleach in mercuric chloride-wash-refix-wash-rebleach in the ferricyanide 30-wash-photo-flo regime, it offers no improvement over anything else listed in this formulary. It is poisonous, and permanence of the holograms is questionable

Shelf life: This stock solution lasts practically indefinitely.

"NO PATCHY HAZE" Fe EDTA

12 g Ferric Sulfate
12 g di-Sodium EDTA
30 g Potassium Bromide
50 g Sodium Bisulfate)
One litre water

Bleaching time: To clear plus one minute. (Usually in excess of six minutes!)

Temperature: 20C Agitation: None

A slow, diluted Fe EDTA bleach which eliminates non-uniform scattering patches throughout the emulsion. The key to success is to avoid the urge to agitate, as this one can take up to fifteen minutes to clear a well-exposed plate.

Shelf life: Leaving the solution exposed to air (uncovered tray) will extend the lifetime of the oxidizer. It has run its useful course when it takes very long to completely clear, like over 5 minutes.

PBQ #3

30 g Potassium Iodide
15 g Borax
2 g Potassium Dichromate
2 g p-Benzoquinone added just before use.
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

Shelf life: Probably not too long after the PBQ is added.

FERRICYANIDE 30

30 g Potassium Ferricyanide
30 g Potassium Bromide
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

For rehalogenation after fixing. The first transmission bleach I was introduced to, however it's best not to bother with because it prints out almost immediately.

Shelf life: This stock solution lasts practically indefinitely.

PYROCHROME BLEACH ('CHROME BLEACH)

4 g Potassium Dichromate
4mL Sulfuric Acid (or 12 g Sodium Bisulfate)
One litre water

Bleaching time: Time it takes to clear plus 15 seconds, not to exceed 2 minutes.

Temperature: 20C Agitation: Constant

Distilled water is recommended otherwise white scum may collect in the emulsion. First hologram in the bath may take a long time to clear. When clearing time exceeds two minutes the bath is becoming saturated with silver salts and needs to be replaced. Hanging the plate vertically in a tank or with emulsion side down in a tray during bleaching speeds the exit of the soluble silver salts from the emulsion.

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4mL Sulfuric Acid (or 12 g Sodium Bisulfate)
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TJ's BLEACH

2 g Potassium Dichromate
2 mL Sulfuric Acid (or 6 g Sodium Bisulfate)
30 g Potassium Bromide
One litre water

Bleaching time: One and a half times the time it takes to clear.

Temperature: 20C Agitation: Intermittent

The first bleach that I saw that worked with the Agfa HD series of emulsions when they came out, in conjunction with Kodak D-8 as the developer. It is a bit noisier than current formulations, but just as bright. It is a variation of the Kodak R-10 formula.