

PHOTOGRAPHERS' FORMULARY INC.

FORMULARY THIOUREA TONER BLEACH AND REDEVELOPMENT

To make 1 liter of bleach working solution and 1.8 liters of thiourea toning solution.

To obtain beautiful rich brown, sepia-like tones, the print is first bleached using a ferricyanide-bromide bath then redeveloped in a sulfide bath. In this process, the silver metal in the print is first converted to silver bromide then to brown silver sulfide. The resulting print can give the impression of a print made in the late 1800's.

The thiourea toner is actually a sulfide toner. In alkaline solution, thiourea (thiocarbamide) reacts to yield sulfide ions, the active ingredient in the toning bath. The advantage of this process is the avoidance of the foul smelling sodium sulfide bath.

The chemicals in this kit are used to prepare 1 liter of working bleach solution that can be reused. The chemicals for the toning solution are packaged so that only the desired amount of solution need be prepared for use in a single working session. A total of a little less than 2 liters of toning bath can be mixed with the chemicals contained in this kit

CHEMICALS CONTAINED IN THIS KIT

Chemical	Amount
Potassium Ferricyanide	50 g
Potassium Bromide	10 g
Sodium Carbonate, Monohydrate	20 g
Thiourea (Thiocarbamide)	5g
Sodium Hydroxide	10 g

CHEMICAL SAFETY

All chemicals are dangerous, and must always be handled with respect. Please read the chemical warnings on each package.

Sodium hydroxide, as a solid or in solution, is a dangerous chemical. It is corrosive and will cause a chemical burn. Its action is insidious because the burn occurs without pain. When working with sodium hydroxide, wash your hands frequently without using soap. If you detect a soapy feeling while washing, sodium hydroxide is present; in such a case wash thoroughly with soap and water.

The beads or pellets of solid sodium hydroxide can easily spill during solution preparation. If spillage occurs outside a sink, all of the spilled solid must be cleaned up. Use a damp sponge or paper towel. If the solid isn't cleaned up, it will absorb moisture from the air and form a puddle of very caustic hydroxide that will not disappear with time. Proper technique for preparing sodium hydroxide solutions is described in the Mixing section of these instructions. We strongly urge you to wear both safety glasses and rubber gloves when working with solid sodium hydroxide or its solutions.

Thiourea is neither toxic nor corrosive but, unfortunately, it is a potential carcinogen. Use rubber gloves when mixing or handling this compound or its solutions. Wash the work area, trays, and all mixing utensils with water followed by soap and water. Should a solution containing thiourea be spilled on the skin, wash immediately with water followed by soap and water.

Potassium Ferricyanide: In spite of the fact that this compound contains cyanide, it is not particularly toxic. The reason is that the cyanide groups are bound to the iron atom and are not free to act as a poison. The cyanide groups can be released as hydrogen cyanide gas if the potassium ferricyanide is placed in a strong acid solution, however the bleach bath in this toner does not call for the use of acid.

Please consult with local sewer and water authorities regarding the proper disposal of darkroom chemicals in your area.

The user assumes all risks upon accepting these chemicals. IF FOR ANY REASON YOU DO NOT WISH TO ASSUME ALL RISKS, PLEASE RETURN THE CHEMICALS FOR A FULL REFUND.

MIXING THE SOLUTIONS

Stock Solution A (The Bleach Working Solution)

You will need a dark brown bottle with a capacity of at least 1 liter to hold the bleach solution. You will find it convenient to first mix the solution in a temporary mixing bowl then transfer the solution to its storage container.

Chemical	Amount
Distilled Water (52C/125F)	750 ml
Potassium Ferricyanide	50 g
Potassium Bromide	10 g
Sodium Carbonate, Monohydrate	20 g
Cold Water To Make	1000 ml

Place the warm water in the temporary container (or storage container) and add the potassium ferricyanide. Stir the solution until the solid dissolves. Next, add the potassium bromide and again stir the solution to dissolve the solid. After the potassium bromide is in solution, add the sodium carbonate. As before, stir the solution to dissolve the solid. Finally add cold water to bring the final volume of the solution up to 1000 ml. Stir the final solution to ensure it is homogeneous.

It is best to store this working bleach solution in the dark. Potassium ferricyanide solutions are somewhat light sensitive. Should the stock solution turn blue (from photo-formed ferrous ions reacting with the ferricyanide to form Prussian blue) the bleach has been ruined and must be discarded.

Stock solution B (Hydroxide for the Toning Bath)

You will need a plastic mixing bowl and a plastic storage container, each with a capacity of at least 100 ml; a plastic spoon; a plastic funnel; and a graduated cylinder to mix this solution.

Chemical	Amount
Sodium Hydroxide (52C/125F)	10 g
Cold Water (20C/68F or less)	100 ml

This solution must be prepared in a sink and in a well-ventilated area. Place a plastic mixing bowl in the sink. Measure out 75 ml of cold water and pour the water into the container. Carefully add the solid sodium hydroxide to the water. Stir the mixture with a plastic spoon until the solid has gone into solution. Stir gently and avoid splashing the solution.

When sodium hydroxide goes into solution, considerable heat is generated. If your water was not cold enough the solution may start to steam. If this should occur, add some ice to cool the solution. DO NOT BREATHE THE VAPOR. It contains sodium hydroxide vapor. If the solution starts to steam and you cannot cool it, leave the room and let it cool off by itself. After the solid has gone into solution, let the solution sit until it reaches room temperature. Transfer the sodium hydroxide solution to its plastic storage container using a plastic funnel. The transfer should be carried out in the sink. Add sufficient cold water to make 100 ml using a portion of the water to rinse out the mixing bowl.

Before any of the mixing equipment leaves the sink, rinse and wash with cold water until you are positive that no residual hydroxide remains. Be sure to wash the outside of the storage container before you remove it from the sink. If any of this solution spills on your skin, wash immediately with cold water followed by soap and water.

Should any of this solution be spilled on your skin, wash immediately with cold water followed by soap and water.

Stock Solution C (Thiourea for the Toning Bath)

You will need a mixing bowl and a storage container each with a capacity of at least 100 ml; a spoon; and a graduated cylinder to mix this solution.

Chemical	Amount
Thiourea	5 g
Water (20C/68F)	100 ml

Place the water in the mixing bowl and add the thiourea. Stir the solution until the solid goes into solution then transfer it to the storage container. Be sure to wash all utensils after use.

Mixing the Working Toner Solution

Mix just prior to use. To prepare the toning solution, mix 1 part stock Solution B, 1 part Stock Solution C, and 16 parts of water. For example:

Approximate Volume of Toning Solution Desired

Chemical	Parts	250 ml	500 ml	1000 ml
Stock solution B	1	14 ml	28 ml	56 ml
Stock Solution C	1	14 ml	28 ml	56 ml
Water (20C/68F)	16	224 ml	448 ml	896 ml

Once mixed, the toner is stable for a working session but cannot be saved. Dispose of the spent solution in accordance with local sewer and water authority regulations.

USING THE TONER

Correctly exposed and fully developed prints work best with this toner.

Bleaching the Print

Stock Solution A is used at room temperature without dilution as the bleach. The print to be bleached must be thoroughly washed and wet before it is immersed in the bleach solution. If residual hypo is left on the print, the hypo combined with the ferricyanide in the bleach will cause permanent loss of the image.

Pour just enough stock Solution A to cover a print into a plastic or glass tray. Immerse the print into the bleach solution and gently rock the tray. The black image will be converted to a light brown or straw colored image in about one minute. Wash the bleach print in running water (20C/68F) for 15-20 minutes. During the wash the yellow ferricyanide color on the print will be lost.

The bleach solution can be reused; therefore, return it to its container

Redevelopment

Place the working solution in a plastic tray and immerse the well-washed, bleached print in it. Work at room temperature. Redevelopment of the image to a rich sepia tone will occur in about 1 minute.

After redevelopment wash the print in running water for about 30 minutes.

After Treatment

The sulfide-hydroxide toning bath will soften the emulsion of the print. Therefore, it is advisable to harden the print before it is dried. The chemicals for a hardening bath are not contained in this kit. Should you wish to prepare a hardening bath, use the following formula:

Chemical	Amount
Water (52C/125F)	500 ml
Sodium sulfite*	15 g
Acetic acid, 28%	40 ml
Potassium alum	15 g
Water to make	1000 ml

*Sodium sulfite (Na₂SO₃) is not sodium sulfide (Na₂S). Sodium sulfite is a white powder; sodium sulfide comes in the form of yellow chips.

Harden the print for about 5 minutes in this bath then wash in running water for 30 minutes.

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