

PHOTOGRAPHERS' FORMULARY

FORMULARY IRON GREEN/BLUE TONER

To make 1 liter of toning solution and 1 liter of sulfide stock solution
For use as either Iron Green or Iron Blue toning.

This toner used to tone fiber-based print green or blue, depending on method of use. The green tones are true greens rather than the blue-green tones obtained with most green toners. The blue tone is a bright blue, brighter than Formulary Iron Blue. The toner should be mixed 12 to 24 hours before use and exposed to light for that time.

CHEMICALS CONTAINED IN THIS KIT

This kit contains the following chemicals:

POTASSIUM FERRICYANIDE	8g
FERRIC AMMONIUM CITRATE	8g
SODIUM SULFIDE	20g
SODIUM BISULFATE	6g

CHEMICAL SAFETY

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

SODIUM SULFIDE is not Sodium Sulfite. Sodium Sulfite (Na_2SO_3), a preservative used in almost all photographic developers, is considered to be a bland chemical. Sodium Sulfide (Na_2S) is a powerful fogging agent and is used mainly in toning baths. It is considered to be a dangerous chemical unless it is used correctly.

Sodium Sulfide should be used with considerable care. Do not allow it to come into contact with acid or any acidic solutions, such as a stop bath or a fixer. Sodium Sulfide (as a solid or in solution) will react with acid to form Hydrogen Sulfide (H_2S), a foul smelling and poisonous gas. Since this is exactly what you do in preparing the sulfide bath in this kit, please follow the directions carefully.

Sodium Sulfide and its solutions are caustic. Do not allow them to come into contact with the skin because they can cause a chemical burn. If contact should occur, wash the area first with cold water followed by soap and water.

Dispose of solid Sodium Sulfide or a solution of Sodium Sulfide down a drain. First, run cold tap water down the drain for about 5 minutes to make sure no acid remains in the drain trap. Place the solid or pour the liquid into the drain pipe. Finally, run tap water down the drain for at least 10 minutes.

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.

To dispose of excess Potassium Ferricyanide (solid or in solution), wash the material down the drain with excess water.

Consult with local sewer and water authorities regarding 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 WITHIN 30 DAYS FOR A FULL REFUND.

MIXING THE SOLUTIONS

Toner Solution

You will need one glass or plastic temporary mixing container with a capacity of 1000 ml to mix the toner solution. You will also need one 1-liter glass or plastic storage container to store the mixed toner solution.

If at all possible, use either distilled or de-mineralized water to mix the toner solution. Hard water often contains iron ions which will alter the chemistry of the toning solution.

TONER WORKING SOLUTION

CHEMICAL	AMOUNT
Water (52° C/125° F)	500 ml
Ferric Ammonium Citrate	8 g
Potassium Ferricyanide	8 g
Sodium Bisulfate	6 g
Water to make	1000 ml

Place the 500 ml of water in the temporary container and add the Ferric Ammonium Citrate. Stir until the solid goes into solution. Add the Potassium Ferricyanide and again stir the solution until the solid dissolves. With stirring, slowly add the Sodium Bisulfate. Finally add cold water to bring the final volume up to 1000 ml. Store the toner solution in a clear bottle in the light for 12 to 24 hours before use. (Ferric Ammonium Citrate is somewhat light sensitive and in strong light, will be converted to ferrous ions which will cause the solution to turn dark green/blue.)

SULFIDE STOCK SOLUTION

You will need a 1 or 2 liter mixing bowl and a 1 liter storage container. WORK IN A WELL VENTILATED AREA.

Chemical	Amount
Water (20° C/68° F)	800 ml
Sodium Sulfide	20 g
Water to make	1000 ml

Place the 800 ml of water in a mixing bowl and add the Sodium Sulfide. Stir the solution until the solid dissolves. Transfer the solution to a storage container and add sufficient water to bring the final volume up to 1000 ml. Cap and shake the container to ensure the final solution is homogeneous. Wash all utensils thoroughly with cold water followed by soap and water.

PREPARING THE SULFIDE BATH

You will use part of the toner solution to make this solution. This solution should be mixed immediately before use.

Mix the sulfide bath and use it in a well ventilated area. Hydrogen Sulfide gas will be released in this step and it is imperative that this gas be vented or dissipated in a harmless manner.

Mix only the volumes given below for a single working session. Do not mix larger volumes. The reason is that a limited amount of sulfide will be used and if an error should occur, dangerous amounts of Hydrogen Sulfide will not be released.

Chemical	Amount of Working Solution Desired	
Water (20° C/68° F)	440 ml	880 ml
Sulfide Stock Solution	50 ml	100 ml
Toner Solution	10 ml	20 ml
To Make	500 ml	1000 ml

Place the water in the toning tray and add the Sulfide Stock Solution. Rock the tray back and forth to mix the solution then add the toner solution. Again mix the solution by rocking the tray back and forth. DO NOT SNIFF THE MIXED SOLUTION!

TONING THE PRINT GREEN

All toners work best if the print is fixed with a non-hardening fixer such as TF-4 (catalog number 03-0141). A hardening fixer decreases the permeability of the gelatin of the print thus decreasing the ability of the toning chemicals to reach the silver metal in the print.

Toning will cause some intensification in the final print, however the depth of the color is dependent on the silver density of the starting print. Best results seem to result when the starting print has a density somewhat lighter than you desire in your final toned print.

The green tone obtained from this kit will change to blue in chlorinated alkaline water so water baths are preferably acidified. It is not necessary however in all cases, depending on your water. This is accomplished by adding 10 to 50 ml of 2% acetic acid stop bath per 500 ml of water. The amount needed should be determined using test strips. Also, since water drops may cause blue spots on the print, use a wetting agent such as Forma-Flo (catalog number 03-0195) in the final water bath in the ratio of 1 ml of Forma-Flo per 250 ml of water.

Use constant agitation throughout the process: All baths should be 20° C/68° F.

30 sec. - 1 min.	Sulfide Bath: 50 ml Sulfide solution plus 10 ml toner solution and 450 ml water.
30 sec. - 1 min.	Water Bath: with 10 ml 2% acetic acid stop bath per 500 ml water.
2-3 min.	Toner Solution
10 sec.	Water Bath with 10 ml 2% acetic acid stop bath per 500 ml water.
10 sec.	Water Bath with 10 ml 2% acetic acid stop bath and 1 ml of a wetting agent per 250 ml water.

NOTES

Dry the print as quickly as possible, or there will be a shift towards blues. If the toning is not uniform on the print, it was not in the toner solution long enough, or it wasn't agitated enough. The toned print may be put back in the toner solution to correct for this problem even if the print has been dried. This will also intensify the green slightly. Change the water baths frequently - every 4 or 5 8x10's.

TONING THE PRINT BLUE

Follow the directions for toning the print green except omit the acid and wetting agent from the water baths and let the print soak in plain water 4-5 minutes or until the blue tone is obtained.

NOTES

Any print that has been toned green may be made blue by allowing it to soak in plain water. If your water is very acid you can add a tablespoon of table salt to the water to speed up the process.