

**PHOTOGRAPHERS'  
FORMULARY**

P.O. Box 950 • Condon MT 59826 • 800-922-5255 • FAX 406-754-2896

**Gum Bichromate Kits 07-0100 & 07-0105****Contains chemicals to make approximately 35 8x 10 prints**

The following is a general overview on how to gum print. It is meant simply as a summary of the process.

For complete details on gum printing please refer to *Gum Printing* by Stephen Livick available from Photographers Formulary Inc., or from the author at [www.livick.com](http://www.livick.com)

**CHEMICALS CONTAINED IN THIS KIT**

This kit contains the following chemicals:

<b>Chemical</b>	<b>Amount</b>
Potassium Dichromate	40.0 grams
Pure 100% Liquid Gum Arabic	250 ml
Potassium Metabisulfite	10 grams
Gelatin	10 grams
Glyoxal	15 ml
Pigment(s)	1 or 3

It is also recommended that you purchase a gram scale capable of measuring down to 1/2 gram if you wish to be proficient in gum printing.

**CHEMICAL SAFETY**

All chemicals are dangerous and must be treated with respect. This kit contains one chemical that needs special attention, Potassium Dichromate: This is both a toxic and an oxidizer. To dispose of excess potassium dichromate, always wash the solid down a drain with copious amounts of water. Never dispose of the solid in a wastepaper basket. Spillage of a dichromate solution on the skin will cause a chemical burn, which will appear as an ulceration. In addition, all chromium salts are potential carcinogens. We strongly advise you to use disposable rubber gloves when handling this compound or its solutions. Clean all trays and containers thoroughly with water followed by soap and water. Dispose of all excess dichromate salts and their solutions down a drain with large volumes of water. Contact local sewer and water authorities regarding proper disposal of darkroom chemicals in your area.

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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 credit or exchange.

## MIXING THE SOLUTIONS

### The Dichromate Solution

Mix the 40 grams of Potassium Dichromate with 250 mls of warm DISTILLED water, 120°F.

All chemicals and pigments should be carefully weighed or measured before mixing and recorded in a notebook to help maintain consistency.

### THE GUM EMULSION:

The first step before you can mix or coat the emulsion, is to determine the ratio of gum to watercolor pigment you will start with.

For a starting point begin with 2 grams of watercolor pigment to 12ml of gum solution. This is a special mix for Sennelier pigments. Consider this to be your base mix. For an 8X10 print mix only 1/2 gram of pigment to 6 ml of gum solution and 6 ml of Potassium Dichromate. You will have some emulsion left over after brushing the emulsion onto the paper. Watercolor pigment to gum solution ratios can go as high as 4 or 6 grams of pigment or as low as 1/2 gram to 12 ml gum depending on the color, the nature of the pigment and the required saturation.

### MAKING A SUITABLE NEGATIVE FOR GUM PRINTING:

The negative is critical to your final results and should be created especially for the gum process. Gum printing is a contact procedure and your negative must be the same size you wish the final image.

Generally speaking, a rich or full shadow detail negative, one that has a slightly flat tonal range, is needed to obtain good results. Gum printing produces its best results in the mid tone areas of negatives. It is best to expose your negative for full shadow detail or use subjects, which lend themselves to the printing characteristics of the process.

There are a number of different negative options that can be used, these include continuous tone negatives, lithographic or inkjet negs.

### SHRINKING THE PAPER:

Pre-shrinking the paper is a key element of ensuring accurate registration.

Watercolor paper expands when wet and shrinks to a smaller than the original size when dry. Watercolor paper should be pre-shrunk for 30

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### FULL COLOR PRINTING

It is possible to make full color gum prints, rivaling the colors of conventional processes.

The best way to do this is to use color lithographic separations. Three separate negatives will be needed to print one image. Each negative must be separated into its component colors. The yellow negative isolates the yellow tones in the image, and the same for the magenta and cyan negatives.

Print the yellow coat first, which is yellow watercolor pigment used with the yellow separation negative. A day later print the magenta coat, which is a pink/red watercolor pigment used with the magenta negative. Follow that on the third day with the cyan coat, which is a blue watercolor pigment used with the cyan negative.

Balance the colors by exposing each color for different times. Each color may have a different gum to pigment ratio and require different exposure times. In addition, putting one color on top of another will affect the density and final color of the print.

One of the biggest problems with full color printing is keeping accurate registration. If the negatives do not match up on the paper when they are printed you will be able to clearly see the off register. If the same temperature and humidity can be maintained during printing the paper will return to its same size each day, eliminating many of the registration problems.

The simplest method for registering negatives is to lay the negative on the paper and pencil mark the corners forming an "L". Use a small piece of removable tape to keep the negative in place as you lower the glass.

Another easy method is to put two pinholes, at opposite corners, through the negative and into the paper using push pins. When doing the second coat, place the negative on the paper and with the pushpins positioned in the holes, carefully locate the pinholes in the paper using the tip of the pin. Once the holes are found, use a small piece of removable tape to keep the negative in place. Remove the pushpins and lower the contact glass.

As always with registration, you should always use your eyes to ensure it looks correct. Even when using complicated methods, registration should always be verified before exposing the second or third coats. Use a tiny flashlight to examine the corners of the negative just to ensure they line up properly.

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minutes in 140° F water and fully dried before adding the gelatin coating.

### GELATINIZE THE PAPER:

Sizing keeps the emulsion on the surface of the paper. Without sizing the image can settle into the paper, resulting in poor quality and difficulty in clearing the emulsion that was not exposed.

If you are doing one coat gum prints it may not be necessary to use a gelatin sizing. Try prints with sizing and prints without to determine for yourself which method you prefer. Mix the 3.25 grams of gelatin into 125 mls of DISTILLED WATER, and let stand 1/2 hour. Then warm gelatin but do not boil. Then add 5 mls of Glyoxal as the hardener. Brush this mixture onto the area where you will coat the emulsion onto your paper. Make sure you cover all the image area.

### COATING THE EMULSION ONTO THE PAPER:

Storing emulsion-coated paper does not work in gum printing as the emulsion quickly deteriorates. WORK ONE SHEET AT A TIME. Brush the emulsion on the paper with your

natural bristle brush. Do not over brush do only one quick smooth out with the same coating brush.

#### **DRYING THE EMULSION**

The paper should be dried lying flat in complete darkness. A fan can be placed to blow across the paper to speed the process. Do not force dry the emulsion with a hair dryer or heat fog may occur. Dry for 30-45 minutes Ideal conditions are 60% humidity at 68°F. If left to dry too long, the emulsion will start to set in the paper and the highlights will be muddy.

#### **EXPOSING THE EMULSION**

It is impossible for anyone to tell you the correct exposing times for your particular gum to pigment ratio combined with your light source and type of negative the amount of pigment you have in the emulsion may require a longer exposure time.

Exposure is affected by the ultra violet light source you use, the distance the light is from the contact frame, the density of the negative and the amount of pigment to gum ratio. The best light source is the metal halide with a bulb designed for bichromated emulsions. A 1000-watt quartz lamp and photofloods can be used, as well as the sun. If you are using fluorescent black light remember to adjust your negatives accordingly, as these types of lights tend to print flat.

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#### **DEVELOPING THE PRINT:**

You will need three trays of 68°F (20°C) clean water. Once exposed remove the negative and quickly place the paper in the first water bath FACE DOWN. Do this under low light conditions, (a 40-watt bulb) until the paper is fully under water. Then turn on the room lights. Gently poke the paper occasionally to keep the paper submerged and to create some waves. After five minutes carefully pick up the paper and gently replace it back into the same tray face down. Do not over do the wave-making. When the paper has been in the first bath for ten minutes move to the next tray and repeat. When finished, hang to dry.

#### **DRYING THE PAPER:**

Suspend the print to dry on a line in your work area. Usually over night or several hours with a smaller print. Dry the print naturally. Force drying the paper with heat could affect the registration on subsequent coats. Once the print has fully dried place it under a piece of heavy glass or a print flattener to take any curl out of the paper. Imperfections can be spotted with watercolors.

#### **CLEARING THE DICHROMATE STAIN:**

This final stage should be carried out when the printing is completely finished. If you are doing three emulsion coatings, you will not clear the print until the end, after all three colors have been applied to the paper. Do this step once per print. Mix 5 grams of Potassium Metabisulfite with 500 ml of distilled water and put it into a plastic spray bottle. Sprits this solution on the image surface of your print and let sit for one minute, then wash the print for ten minutes. Be careful at this stage, as the surface is susceptible to damage. If you are testing colors and wish to see the "true" color you must clear the print of the dichromate stain.

Using a good brush and working in very subdued light or in a darkroom under a red safety light, brush the sensitizer solution onto the paper, pinned to a board. The brush strokes should be from top to bottom and from side to side.

#### **PRINTING SECOND AND THIRD EMULSION COATINGS:**

This will build depth in the print. A color combination in "free form" gum printing is what makes gum printing "fun". For example if you print a blue coat first followed by a red coat the result is a purple magenta looking print. There are many combinations, you just need to find the right combination that you like best for the images you are printing.

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