Colored Discharge Printing using PRO Vat Dyes

Vat Dyes are a unique class of dye, similar to Indigo. The dye powder is not soluble in water, nor does it have any affinity for cellulose or silk fibers, until it goes through a process called reduction. Reduction in the printing process takes place when the fabric is steamed. The vat dye color will then appear when the fabric is removed from the steamer, rinsed and oxidized in the air. You will have the best results when printing vat dyes on a ground cloth that you have dyed with a fiber reactive dye, such as the PRO MX Dyes. This process is considered an intermediate to advanced technique. The results are not as predictable as when working with other classes of dyes. Always do test samples before working on a large project. For additional information, visit our website at www.prochemicalanddye.com

✖ Wear rubber gloves, apron or old clothes.
✖ Utensils used for dyeing should never be used for food preparation.

Supplies
- PRO Vat Dye Powder
- Guar Gum
- Formosul
- Potash
- Glycerin
- Synthrapol
- Ivory Soap (bar or flakes)

Procedure
1. Prepare your print table with a drop cloth. Stretch and pin your ground cloth, previously dyed with a fiber reactive dye, such as the MX Dyes. Gather your printing supplies - silk screen and squeegee or plexiglass or vinyl to monoprint with.

2. Prepare the thickener paste a few hours, or even the day before you need to use it. This recipe will make 1 quart (1 liter) of thickener. (Please reduce appropriately if you do not need the full quart). In a large plastic or stainless steel bowl, measure 1 quart (1000 ml) of room temperature 75-95F (24-35C) water. In a separate dry container measure ⅔ cup (100 gm) of guar gum. Using an electric hand mixer (you will not be able to mix this by hand), start blending just the water, then gradually sprinkle in the guar gum. Continue blending until well mixed. Allow to stand several hours or overnight for a smooth paste. NOTE: This thickener will keep for only three days.

3. Dissolve the Formosul. We have found that dissolving the Formosul the day before you make your colored discharge makes a world of difference in the ease of dissolving it.
Heat some water to 120° (48°C). Measure the amount of Formosul from the chart above in a quart (liter) container. Add the appropriate amount of hot water to the Formosul and stir well. Initially Formosul is quite hard and almost rock-like. Allowing the Formosul to sit overnight will soften it, for ease in dissolving. We suggest using a tool like a quarter inch dowel or chop stick to grind any remaining particles of Formosul the following morning, almost in the fashion of a mortar and pestle.

4. **Dissolve the dye powder.** This recipe makes one cup (250 ml) of colored discharge paste. Measure the desired amount of dye powder, from the chart below, in 3 Tbl (45 ml) hot water 120° (48°C) water and set aside, while measuring the remaining ingredients.

<table>
<thead>
<tr>
<th></th>
<th>Pale</th>
<th>Medium</th>
<th>Dark</th>
<th>Black</th>
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<tbody>
<tr>
<td>Dye Powder</td>
<td>½ tsp (1.25 gm)</td>
<td>2 tsp (5 gm)</td>
<td>4 tsp (10 gm)</td>
<td>8 tsp (20 gm)</td>
</tr>
</tbody>
</table>

5. **Prepare the colored discharge paste:**
Add the following ingredients to dissolved Formosul from Step #3, stirring well after each addition.

<table>
<thead>
<tr>
<th></th>
<th>All colors, except Black</th>
<th>Black</th>
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</thead>
<tbody>
<tr>
<td>Glycerin</td>
<td>2 tsp (10 gm)</td>
<td>3 tsp (15 gm)</td>
</tr>
<tr>
<td>Dissolved Dye Powder</td>
<td>From Step #4</td>
<td>From Step #4</td>
</tr>
<tr>
<td>Potash</td>
<td>4 ½ tsp (20 gm)</td>
<td>5 ½ tsp (25 gm)</td>
</tr>
<tr>
<td>Thickener paste from Step #2</td>
<td>100 gm (between 1/3 and ½ cup)</td>
<td>100 gm (between 1/3 and ½ cup)</td>
</tr>
<tr>
<td>Room temperature water 75° to 95°F (24° to 35°C)</td>
<td>to equal 1 cup (250 ml)</td>
<td>to equal 1 cup (250 ml)</td>
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Stir well. You may want to use the electric hand mixer to blend a nice, smooth paste. Set the colored discharge aside for about one hour before using it, so that the vat dye will have a chance to start becoming water soluble, before the printed fabric is steamed.

6. **Print the fabric** and allow it to dry thoroughly. It is recommended to steam the piece within 24 hours, for best results.
7. **Steam the printed fabric.** Your best results will come from steaming using a stove top steamer OR pressure cooker, as described below. Bullet steamers don’t work as well with the vat dyes.

**STOVE TOP STEAMER**

You can use a canning kettle or a two part steamer, where the top half has perforated holes in it to allow the steam from the boiling water to saturate the fabric.

A. The stainless steel or enamel pot or canning kettle must be deep enough to hold the wrapped fabric and wide enough so that the fabric bundle does not touch the sides of the pot. Invert the wire basket or bottle rack and place it in the bottom of the canning kettle. This serves as a platform for the bundled fabric to rest.

B. Put several inches of water in the bottom of the steamer. Make sure the water does not touch the bottom of the wire platform where the fabric bundle sits. Turn on the heat and once the water is boiling and is producing a good head of steam, you are ready to place the fabric in the kettle.

C. Make sure your painted or printed fabric is dry. Loosely roll the fabric, jelly roll fashion, in between a piece of muslin, cotton sheeting, pellon, blank newsprint, or kraft paper, so the patterned surface does not come in contact with itself. Then roll it like a cinnamon roll and loosely tie it to secure this shape.

D. Place the fabric bundle on top of the inverted wire basket, only when the water has come to a boil and you have a good head of steam. NOTE: Keeping the steamer as air tight as possible will give you the best results. Wrapping the top of the pan with a layer of aluminum foil will help to keep it air tight. You may also want to cut several circles if newspaper and place them on the top of and below the fabric bundle, prior to steaming, to collect the excess condensation.

E. Set the timer for 10 -15 minutes. Check the amount of water periodically and add boiling water as necessary.

**PRESSURE COOKER:**

We found that we got better results when using a pressure cooker, designated for studio use only. The color was darker and the halo around the printed image was more crisp. Follow the directions for your pressure cooker, making sure that you have at least two inches of water in the bottom (you don’t want the cooker to explode). Place an expandable vegetable steamer in the bottom, with about 8 circles of newsprint on top of it to keep excess moisture from saturating the bottom of the fabric bundle. Then place your fabric bundle (prepared as in Step C above) in the cooker and put on the lid and the pressure gauge. We found that 10 minutes was sufficient to process the fabric.

8. **Rinse your fabric.** Remove your fabric from the steamer, unroll and rinse in room temperature 75̊ to 95̊F (24̊ to 35̊C) water. Hang to oxidize and develop the color, for at least 20 minutes.

9. **Final wash.** As a final step, we recommend “soaping” the fabrics to prevent any crocking (rubbing off) of any insoluble vat dye deposited on the surface of the cloth, firmly fixing the dye within the fiber. Take a bar of Ivory soap and shave a couple of tablespoons worth of the soap into 2½ gallons (10 liters) of water. Bring the soapy water to a boil and continue washing your fabric at a gentle simmer for 15-20 minutes. Rinse well and dry.

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