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Indigo

Please read the directions carefully before starting.

Indigo belongs to a class of dyes called vat dyes, which are among the oldest natural coloring substances used for textiles. Until the beginning of this century, indigo could be obtained only from plants. Two things are required to make indigo work, Thiox, the reducing agent, and Lye, the alkali. The dye vat is prepared in two steps: The stock solution and the dye vat. The stock solution then added to the dye vat. Always do test samples before working on a large project.

✱ While Indigo and the chemicals used are comparatively safe and non-toxic, it is best to treat them all with caution. Wear rubber gloves to minimize contact with hands. Eye protection is urged as you are working with alkalies and strong reducing agents. Always work in a well ventilated area. Good house-keeping is essential to good results. Utensils used for dyeing should never be used for food preparation. See caution for Lye (Sodium Hydroxide) below.

Caution

Lye (Sodium Hydroxide) Can cause severe burns to skin, eyes and mucous membranes upon contact. Do not inhale fumes. Harmful if swallowed or misused.

First Aid: Eyes: Immediately flush eyes with cool water for 20 minutes. Get medical attention immediately. Skin: flush area with water for 15 minutes and then wash with soap and water. Get medical attention immediately. Swallowed: Rinse mouth with cold water, and drink one or two glasses of milk or water. DO NOT drink citrus juice or other acidic fluids. DO not induce vomiting. Get medical attention immediately.

Directions for use: Protective clothing, gloves, goggles and respirator should be used when mixing into solution. ALWAYS add Lye to COLD water! NEVER add water (hot or cold) to Lye. Replace cap immediately after use.

Storage & Disposal: Keep out of reach of Children. In case of spillage sweep into dust pan, empty down sink and flush with COLD water. Do not use aluminum utensils.

Supplies

For Cotton, linen, rayon, and silk

PRO Indigo grains
 Lye (Sodium Hydroxide)
 Thiox (Thiourea Dioxide)
 Metaphos
 Non-Iodized Salt
 Distilled White Vinegar
 Ivory Bar Soap or Ivory Flakes

For Wool

PRO Indigo grains
 Lye (Sodium Hydroxide)
 Thiox (Thiourea Dioxide)
 Synthrapol SP
 Unflavored Gelatin
 Clear Household Ammonia
 Distilled White Vinegar
 Ivory Bar Soap or Ivory Flakes

Procedure for dyeing cotton, linen, rayon and silk

1. Determine whether you wish to make a 20 gallon (80 liter) full size vat or 4 gallon (16 liter) mini vat and prepare the stock solution.

	<u>Full size vat</u>	<u>Mini vat</u>
PRO Indigo	1 cup (70 gm)	3 Tbl (15 gm)
Cold water	6 cups (1.5 liters)	1½ cups (375 ml)
Lye	1 cup (215 gm)	5 tsp (23 gm)
Thiox	2 Tbl (25 gm)	1 tsp (4 gm)

2. Mix Indigo with enough lukewarm water to make a lump free paste.
3. Measure the COLD water into a separate container. Carefully add the lye and set aside to cool.
4. In a third container, add the Thiox to 1 cup (250 ml) of warm water (Mini Vat use ½ cup (125 ml) water). Stir gently to dissolve.
5. Slowly add the lye solution to the pasted Indigo and stir to make a smooth mixture.
6. Next, slowly add the thiox solution. Avoid creating air bubbles.
7. Stir this mixture gently from time to time, until reduction is complete. Reduction is complete when the stock solution turns yellow. Otherwise the surface is a deep blue from oxygen coming in contact with the dye. Set the jar of stock solution in a pan of HOT Water, if necessary. Raise the temperature no higher than 135°F (57°C) for 15 to 30 minutes or until reduction takes place.
8. Make the dye vat.

	<u>Full Size Vat</u>	<u>Mini Vat</u>
Warm Water 120°F(49°C)	20 gallons (80 liters)	3 gallons (12 liters)
Metaphos	3 Tbl (63 gm)	1 tsp (7 gm)
Salt	2 cups (600 gm)	1/4 cup (75 gm)
Thiox	4 tsp (15 gm)	½ tsp (2 gm)

9. Measure warm water into dye vat container.
10. Stir in the Metaphos and salt.
11. Dissolve the Thiox in a small amount of warm water and add it to the dye vat.
12. Add reduced stock solution by carefully lowering the container into the Dye Vat and sliding the liquid out at an angle. Stir gently.
13. After 30 to 60 minutes the vat should be clear greenish-yellow with a shiny, dark blue metallic surface. The vat is then ready to use. If the vat is not clear and greenish-yellow in color wait an additional 30 to 60 minutes. It can take as long as 6 hours for proper reduction.

Maintaining the Indigo vat

- * Every precaution MUST be taken to keep oxygen out of an Indigo vat!!!
- * For your vat, use a deep vessel with a narrow top to minimize exposure to air.
- * When adding additional Stock Solution or dissolved chemicals to the vat, do not pour them in. Lower the container into the vat and slide the liquid out at an angle.

Using the Indigo vat

- * Before dyeing, machine wash the fabric on HOT cycle with a minimum temperature of 140°F (60°C) water OR by hand in a pot on the stove with ½ tsp (2 gm) PRO Dye Activator or Soda Ash and ½ tsp (2.5 ml) Synthrapol per pound (454 gm) of fabric. Rinse thoroughly.
- * Thoroughly wet fabrics before dipping in vat. A warm water soak for 15 to 30 minutes is recommended. Wearing gloves, squeeze out excess water evenly.
- * Gently push the dark blue scum aside before entering fabric in the vat. Where scum clings to the cloth it will look dark blue. However, after dyeing is finished the spot will wash off the surface, leaving a light undyed spot.
- * Lower fabric into the vat very gently, without splashing.
- * Slowly manipulate the cloth while working below the surface of the vat. This helps the dye penetrate. Keep fabric submerged for the duration of each dip, 2 to 3 minutes. DO NOT SWISH the fabric around in the vat.

* Gently squeeze out excess dye BELOW the surface and remove fabric from the dye vat. DO NOT allow fabric to drip into the vat after dyeing.

*Let fabric oxidize (turn blue) for approximately 15 minutes. Repeat dipping and oxidizing until you've reached the desired depth of blue. If you've gotten some of the dark blue scum on your fabric, then give it a rinse in plain room temperature water. This way the fabric that is underneath the scum can oxidize. Let the fabric air dry before washing. Remember that after washing, the final color will be one to two shades lighter. If you've done a bound resist dyed fabric it's best to let the fabric dry completely before untying so the threads won't rip the fabric.

Washing the fabric

Wash the fabric in hot 135°F to 140°F (57°C to 60°C) water for 10 minutes in a generous bath of Ivory bar soap or Ivory Flakes. With a knife, it's easy to flake off a 1/8 inch thick peel of soap. Stir the wash bath occasionally and rinse the fabric until the water runs clear. Hang cotton and rayon to dry.

If you're dyeing silk then soak it for 10 minutes in a bucket of acid soak. Make the acid soak by mixing 2 Tbl (30 ml) of White Distilled Vinegar in 1 gallon (4 liters) of room temperature water. Then rinse the silk thoroughly in plain water.

Troubleshooting the dye vat

* If the vat appears grayish and watery, it is exhausted. This means that all the indigo has been used. An addition of Stock Solution is needed.

* If the vat has been left for a few days, it may need to be "Sharpened" with a small amount (1/2 tsp (2 gm) for full size vat) Thiox, dissolved in water.

* If the vat changes from yellow-green to blue, or if blue specks appear, more Thiox is needed. Add a small amount (1/2 tsp (2 gm) for full size vat) Thiox, dissolved in water. Stir gently. Wait 15 minutes and check vat again before dyeing.

* If white specks appear or the vat appears "milky" add small amount (1 tsp for full size vat) of Lye, dissolved in 1/2 cup water. Stir gently. Wait 15 minutes and check vat again before dyeing.

* Occasionally, more than one addition is required to revive a vat. Use small amounts, and wait 15 to 20 minutes between additions, testing each time. Excess alkali or reducing agent can unbalance the vat, making it impossible to build up deep shades. Be patient, and the vat will have a long life.

* Always dissolve Thiox and Lye in water BEFORE adding to the dye vat. DO NOT add dry flakes.

* Cover with a tight fitting lid when not in use.

Troubleshooting fabric

* Dye washes off of fabric: too little reducing agent.

* Crocking off (Dye rubs off): too little alkali

Procedure for dyeing wool

1. Prepare the stock solution.

	<u>Mini Vat</u>
PRO Indigo	3 Tbl (15 gm)
Lye	5 tsp (23 gm)
Thiox	1 tsp (4 gm)

2. Mix Indigo with enough luke warm water to make a lump free paste.

3. Measure 1½ cups (375 ml) of COLD water into a separate container. Carefully add the lye and set mixture aside to cool.

4. In a third container add the Thiox to ¼ cup (60 ml) water. Stir gently until it's dissolved.

5. Slowly add the Lye solution to the pasted Indigo and stir to make a smooth mixture.

6. Add the Thiox solution slowly to avoid making air bubbles.

7. Stir gently from time to time until reduction is complete. Reduction is complete when the stock solution turns yellow. If necessary set the jar of stock solution in a pan of HOT Water. Raise the temperature no higher than 135°F (57°) for 15 to 30 minutes or until reduction takes place.

8. Make the dye vat.

	<u>Mini Vat</u>
Warm Water 120°F (49°C)	3 gallons (12 liters)
Unflavored Gelatin powder	1 tsp (2 gm)
Synthrapol	1 tsp (5 ml)
Clear Household Ammonia	2 Tbl (30 ml)
Thiox	1 tsp 4 gm)

9. Measure warm water into dye pot. Use non-reactive metal such as stainless steel or un-chipped enamel as your dye pot.

10. Mix the remaining ingredients in the order listed above making certain each item is thoroughly mixed before adding the next.

11. Add reduced stock solution by carefully lowering the container into the dye vat and sliding the liquid out at an angle. Stir gently.

12. After 30 to 60 minutes the vat should be clear greenish-yellow with a shiny, dark blue metallic surface. The vat is now ready to use.

13. Maintain a 120°F(49°C) temperature throughout the dye process. Soak your wool for at least 15 minutes in 1 gallon (4 liters) of 120F (49C) water with 1 tsp (5 ml) of Synthrapol. The wool should sink in the Synthrapol soak, not float. Squeeze out excess water evenly from the wool. Gently push the dark blue scum aside before putting your wool into the vat. Wool that is not thoroughly wet carries large quantities of air which quickly oxidize the reduced Indigo and destroy the vat.

14. Soak the wool in the dye vat for 30 minutes with gentle, intermittent stirring, making sure all the wool remains below the surface of the vat.

15. After 30 minutes, remove the wool, squeeze excess liquid back into the vat while holding the wool close to the surface to avoid introducing air into the vat.

16. Let the wool oxidize (turn blue) for approximately 15 minutes.

17. Repeat dipping and oxidizing until the desired depth of blue is obtained.

18. After the final dip and the fiber is fully oxidized, gently wash the wool in a warm 120°F (49°C) water bath for 10 minutes in a generous bath of Ivory bar soap or Ivory Flakes. With a knife, it's easy to flake off a 1/8 inch thick peel of soap. Gently stir the wash bath occasionally and rinse the fiber until the water runs clear.

Then soak the wool for 10 minutes in a bucket of acid soak. Make the acid soak by mixing 2 Tbl (30 ml) of White Distilled Vinegar in 1 gallon (4 liters) of room temperature water. Then rinse the wool thoroughly in plain water and hang to dry.