

# DYEING INSTRUCTIONS

## INDIGO – Organic bath

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Natural indigo can dye many kind of fibers and create shades from light blue to deep and marine blue. The shade will depend on your bath, on the quality and quantity of indigo and number of immersions into the bath.

### EQUIPEMENT AND VESSELS

It is better to use stainless steel, enamel or plastic containers, high and narrow, large enough to well immerse your fibers and prevent any contact of your bath with air in order to avoid indigo oxydation. Dyeing in a basket or a grid at the bottom of the tank avoids the contact of fibers with non-solubilized compounds, for a better uniformity.

It is recommended to wear gloves when handling and a mask when weighing the indigo and lime.

### FIBERS PREPARATION

Weigh the dry fibers before rinsing.

The preparation of the fibers is essential for a good result.

**For cellulosic fibers** (cotton, linen, hemp...), use a hot soap bath with a little washing soda. Heat the bath up to 50-90°C (= 122-194°F). Then rinse the fibers with clear water.

**For wool and silk**, use a hot soap bath at 50-60°C (= 122-140°F). Then rinse the fibers with clear water.

### THE INDIGO BATH

Indigotin, the main dyeing molecule of natural indigo is not water-soluble. It needs to be converted from an oxidized form (blue pigment, insoluble) to a reduced form (greenish yellow pigment, soluble) which will allow to fix on fibers before being again oxidized (by the oxygen of air – a magic step that develops the blue color).

### GRINDING AND PREPARING THE INDIGO PASTE

The reduction step will better operate if all indigo grains are in contact with the reducing solution, thus it is better to use a fine powder.

#### **Prepare the indigo paste by mixing :**

- 1 part of indigo;
- 1 part of alcohol (methylated spirit can be fine) – optionnal but recommended for a better wetting of indigo particles;
- 1-2 parts of hot water.

Well homogenize until getting a smooth paste. Grinding the paste with a mortar is the best but you can only crush the grains against the tank walls.

Alternatively, a small plastic pot and marbles may be used – as shown by Michel Garcia sometimes. In this case, limit or remove the alcohol in order to reduce risks related to vapors.

## REDUCTION OF THE INDIGO VAT

Different natural vat can be used :

### Natural vat with fructose syrup - ingredients

<b>For a 5 liters (1.3 gall.) tank</b>	Medium shade	Dark shade*
Water	5 L	5 L
Indigo in powder	10 g	25 g
Fructose syrup**	42,9 g**	107,25 g***
Hydrated lime	20 g	50 g

\* For a medium shade, you can use these quantities for a 15-20L bath.

\*\*Fructose syrup at 70 % fructose, e.g. respectivelyt \*\*30 g and \*\*\*75 g crystallized fructose.

The size of bath and quantity of ingredients may be adapted according to the fibers and shade. However, it is important to keep proportions of 1 part of indigo /4,29 parts of fructose syrup (= 3 parts of crystallized fructose) /2 parts of lime.

This method was prepared from a natural historical recipe – recently renewed by Michel Garcia<sup>1</sup> under the name "1/2/3 bath" (actually 1/3/2) - using the FRUCTOSE SYRUP that we did select.

Prepare a container large enough with hot water (50-70°C (= 122-158°F)). Using a basket or a grid at the bottom will avoid the contact of your textiles with non-reduced materials.

**A/ Slowly pour the indigo paste into the tank.** Rinse marbles and pots that you may have used.

**B/ Add the fructose then lime IN THIS ORDER** while slowly mixing.

**C/ Gently homogenize the vat** (avoid including air into the solution). The final volume of the bath may then be adjusted with water in order to have enough volume for your textile. Be aware that any dilution will also lighten the colours. The pH must be set (with lime) around 9 for proteinic fibers and around 11 for cellulosic fibers.

**D/ Allow** at least 20 min (**ideally 1 night**) for the reduction process to complete. The temperature must be around 50°C (= 122°F) before dyeing. So it is recommended to prepare the indigo dyebath the day before dyeing. In this case, you can start your bath with around 2/3 of the final volume and adjust the volume with hot water (to be added very slowly) just before dyeing for a final mild bath.

A well-reduced solution must have a greenish-yellow colour, composed of leuco-indigo (white indigo) that can be used for dyeing.

### Natural vat with Iron - ingredients

<b>For a 5 liters (1.3 gall.) tank</b>	Medium shade	Dark shade*
Water	5 L	5 L
Indigo in powder	10 g	25 g
Iron sulfate	20 g	50 g
Hydrated lime	30 g	75 g

\* For a medium shade, you can use these quantities for a 15-20L bath.

Note : This vat does strictly follow the 1/2/3 proportions and incorporation order, conversely to the fructose vat.

**Pour the indigo** into the vat, **then iron sulfate, then hydrated lime IN THIS ORDER** while gently mixing.

Then proceed as described from C/ above.

## Natural vat with Henna - ingredients

<b>For a 5 liters (1.3 gall.) tank</b>	Medium shade
Water	5 L
Indigo in powder	20 g
Iron sulfate	40 g
Hydrated lime	13 g

For this vat, you need previously to prepare a liquid extract of henna as follows :

**Pour the henna powder into a small quantity of water** and make it **boiling for about 5 min.**, filter and keep the first extract separated;

Add a little water to the powder again, then boil again in the same condition, filter and **combine the two extracts**.

**Add the indigo into this extract**, and adjust to the needed volume with boiling water. Then add lime while gently mixing.

Then proceed as described from C/ above.

## DYEING

The fibers must be previously rinsed in mild water and wrung out before the dyebath.

**Immerse the fibers very slowly into the bath.** Avoid any bubbles or air and any contact with the sediment at the bottom of the tank (as previously mentioned a basket or grid may be helpful).

Keep the fibers into the bath for **around 5 to 7 min** (longer if your bath is at room temperature).

**Slowly remove the fibers from the bath** (to allow draining into the tank), wring them out, then expose to air or under a waterflow (use gloves). The fibers will turn from the greenish-yellow to the blue colour under the effect of the oxygen.

It is then recommended to rinse your textile into a bath of water with 1-2 tea spoons of white vinegar that will neutralize the alkaline dyebath, then rinse, then wash again with mild soap until the rinsing water be clear.

For darker shades, the fibers can be dyed again (always humid) into the same bath or in a more concentrated dyebath. Conversely, it is possible to make the colour lighter by dyeing into a less concentrated bath.

### Tips :

- Cellulosic fibers prefer to be dyed at room temperature. For proteinic fibers, dye at mild temperature (35-50°C e.g. 95-122°F);
- For wool dyeing, a pH of 9-9.5 is better (11-11.5 for the other fibers).

## TAKING CARE OF YOUR ORGANIC INDIGO BATH

Your organic indigo bath can be kept for a long time while frequently checking it and adjusting the level of ingredients if necessary. A greenish-yellow colour of the bath will be the sign of a good reduction so you may add some indigo (enrichment), fructose syrup and/or lime (to keep a pH > 9). When not used, a gentle mixing of the bath (everyday or every two days) will contribute to its good condition.

## TAKING CARE OF YOUR TEXTILES IN NATURAL DYEING

In order to preserve your textiles in natural dyeing, we recommend :

- To wash your fabrics at maximum 40 ° C.
- To avoid washing powders (which contain bleaching agents that will quickly fade your color) and bleach. Your textiles can be washed with soap nuts (without bleach that is sometimes recommended), with washing balls or with a liquid soap.
- To dry your fabric away from direct sunlight.

## SHADE SAMPLES

***Indigofera tinctoria* – Cotton** - 16% WOF (1g fabric / 0,16 g indigo) – Bath 1/2/4,3



1<sup>st</sup> bath

2<sup>nd</sup> bath

3<sup>rd</sup> bath

***Indigofera suffruticosa* – Silk** - 100% WOF (1g fabric / 1 g indigo) – bath 1/2/4,3 (1 g indigo / 2 g hydrated lime / 4,3 g fructose syrup GREEN'ING (e.g. 3 g of crystallised fructose)

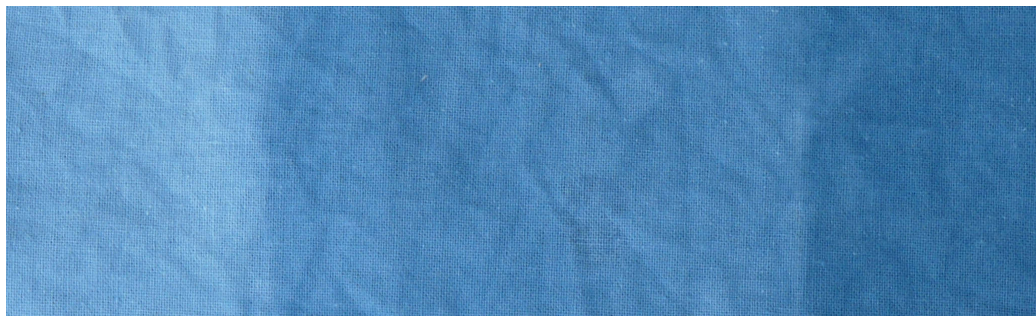


1<sup>st</sup> bath

2<sup>nd</sup> bath

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***Indigofera suffruticosa* – Cotton** - 16% WOF (1g fabric / 0,16 g indigo) – Bath 1/2/4,3



1<sup>st</sup> bath

2<sup>nd</sup> bath

3<sup>rd</sup> bath