

SYNTHETIC DYESTUFFS

SEVERAL OF THE ARTICLES IN THIS ISSUE REFER TO SYNTHETIC DYESTUFFS. HERE IS A SUMMARY OF SYNTHETIC DYESTUFFS AND HOW THEY WORK.

The first synthetic dyestuffs were produced in the mid-19th century, derived from coal tar. 1856 is generally denoted as the birth of the tar industry, when William Perkin managed to isolate a purple dyestuff, which he called mauve (from malva), later known as mauvein. About a century later, in the mid 1950s, I.D. Rattee and W.E. Stephen at ICI (Imperial Chemical Industries) discovered the basis of reactive dyes. (Readymade dyes for use in the washing machine are reactive dyes.) Read more about how reactive dyes work in the articles on Margrét Kållberg and Claes Hedström, pages 21-27.

Both Claes Hedström and Margrét Kållberg dye woollen yarn with weak acid dyes. The acid dyestuff attaches to wool fibre with the help of acidic molecule groups that bond with the alkaline parts of the fibre.

Vat or batik dyes belong to another group of

dyes. In the 1890s, the process for manufacturing synthetic indigo was figured out and used to produce several dyestuffs. Vat dyes are not soluble in water, but can be dissolved with reducing agents in an alkaline solution. Vat dyeing brings about a change in colour and the dye bath is not the same colour as the fibre will have. The textile material turns the same colour as that of the dye bath during the dyeing process, but when the material is exposed to oxygen in the air, the final colour is assumed through oxidation.

The insoluble dyestuff is now held in the fibre. (Cf reactive dyestuffs that bond through a chemical reaction in the dyeing process to unite dye and fibre molecules.) Vat dyes have very good lightfast properties but are less resistant to abrasion. This creates the lighter areas characterizing worn indigo dyed jeans.



The Indigo dyestuff is available in both natural and synthetic forms. The yarn for the cushions on page 44 was dyed following the recipe given below.

INDIGO DYEING

DYEING WOOL WITH INDIGO

Indigo stock solution

250 ml water 50° C

15 g indigo powder (optional meths to paste up the powder)

25 ml lye (Caustic solution) 25%

15 g sodium hydrosulphite (sodium dithionite)

Weigh the indigo and paste up with a little methylated spirit in a lidded glass jar.

Measure out the water, bring up to 50 ° C and stir in the indigo paste. Measure out and add the lye.

Weigh and sprinkle in the sodium hydrosulphite. Stir carefully.

Put the lid on and leave to stand in water warm enough to maintain the stock solution at 50 ° C.

It will be ready in 15-30 minutes. The stock solution can be stored in a glass jar with a tight fitting lid if the jar is filled to the brim with glass beads. This prevents oxygen spoiling the vat.

Dyebath

10 l water +50-55° C

2-4 g gelatine powder

60 mls ammonia 25%

5 g sodium hydrosulphite

Add to the bath in the order given. Use the stock solution according to the strength required. For mid to darker blue, ca 100 mls stock

solution. The dye bath should be a clear yellow-green, possibly with a few small blue bubbles.

Tip: For more even dyeing, start with a weaker strength of dye bath so that the material is more thoroughly impregnated with dye, then add more stock solution to build up the intensity of colour.

Dyeing

The wetted material is immersed carefully below the surface for a maximum of 10 minutes. Take care to avoid oxygen entering the dye bath.

Lift out carefully, then squeeze surplus liquid out and leave to oxidize.

The colour will change from yellow-green to green and then to blue.

Leave the material to oxidize thoroughly!

For stronger shades, alternate repeated dips of about 4-5 minutes with at least 15 minutes between each dip for oxidizing. After dyeing, rinse and wash the dyed material.

Washing out the dyed material

To wash out indigo dyed material, add a scouring agent for wool to the bath of water with the material in and heat up to 65-80° C for 10-15 minutes. Rinse out well. Add vinegar to the last rinse. The scouring improves the colour fastness and makes the material more rub resistant.

DYEING COTTON AND LINEN Use the same stock solution as for wool.

Dyebath

10 l water +20-24° C

2-4 g gelatine powder

2 mls lye (Caustic solution) 25%

2.5 g sodium hydrosulphite (sodium dithionite)

200 g salt for deeper shades

Add to the bath in the order given, and stock solution at the strength desired. (When dyeing linen and cotton, larger quantities of stock solution are required.) The dye bath should be a clear yellow-green, possibly with a few small bubbles. Add, as necessary, a few drops of lye and 1 pinch of sodium hydrosulphite. Wash as for wool.

DYEING SILK WITH INDIGO

Silk is a protein (animal) fibre. It can usually be dyed with dyestuffs intended for wool. The physical composition of silk, however, means that it occupies a place somewhere between animal and vegetable fibres. Many dyestuffs for plant fibre, such as flax and cotton, have also been used, with a greater or lesser degree of success, to dye silk. If using vat dyes, however, it is a matter of keeping the alkalinity as low as possible and ensuring that dyeing takes place at a low temperature.