IMMERSION DYEING WITH PROCOLOUR POWDER DYES ON ALL NATURAL FIBRES

- Natural fibres fall into two categories:

Protein ('P') Fibres	Silk*, wool, alpaca, angora, mohair, fur, feathers, leather, nylon, (unnatural but dyes like a protein fibre).
Cellulose ('C') Fibres	Cotton, linen, hemp, wood, ramie, jute, flax, sisal, rayon, (man made cellulose).

* Of all the above fibres, silk is the anomaly, because though it is a protein fibre, it behaves like a cellulose fibre during immersion dyeing with reactive dyes.

- Procolour dyes fall loosely into two categories (see PROCOLOUR DYE USAGE AND PERFORMANCE GUIDE, TABLE II, column 6) where these categories are designated by the letters 'C', 'PC' or 'P').

'PC' or 'C' = cellulose fibre dyes = REACTIVE DYES.

- 'PC' and 'C 'dyes are applicable on cellulose fibres in alkaline conditions (pH 8.5 to 11)
- 'PC' dyes are applicable on protein fibres in acid conditions (pH 4 to 6)
  exception: silk, though a protein fibre produces better results, with 'PC' dyes in slightly alkaline conditions (pH 8)

'P' = protein fibre dyes = ACID DYES

- not applicable on cellulose fibres
- applicable on protein fibres (silk and nylon included) in acid conditions (pH 3 to 6)

- Powder dyes are the most economical to use for immersion dyeing so all the following recipes will specify powder amounts not liquid.

- All immersion recipes given are per 100 g of fibre so you'll have to weigh the fibre requiring dyeing and scale the recipes up or down accordingly. However, 100 g of fibre is roughly:

  0.8 m of 1 m width cotton muslin
  1 lge cotton tee shirt
  ¼ of a sweatshirt
  1.6 m of I m width 8 MM silk habotai
  0.8 m of 1 m width 16 MM jacquard

IMMERSION DYEING RECIPES

1. For 100 g of CELLULOSE FIBRE dyed with dyes marked 'PC' and 'C' in Table II column 6 (i.e., REACTIVE DYES), the dyeing recipe is as follows:

A				B	C	D
CELLULOSE FIBRE	**WATER**	**DIFFUSANT** Avoid pouring neat diffusant on the fibre, i.e., push the fibre to one side and ensure that the diffusant is well mixed with the bath liquor before it comes into contact with the fibre	**LEVELLER Optional** Avoid pouring neat leveller on the fibre	**POWDER DYE** • Dissolve the dye separately in 100 ml of hot water. • Remove the fibre from the bath liquor and add the dissolved dye. Stir. • Return the fibre to the bath.	**SALT (sodium chloride)** Avoid pouring the salt on fibre.	**SODA ASH (sodium carbonate)** • Remove the fibre from the bath liquor. • Dissolve the soda ash completely in the bath. • Retum the fibre to the bath.
100 g	3 litres	30 ml	100 ml	**pale colours** approx 0.05 g	60 g	7 g
			50 ml	**medium colours** approx 0.5 g	120 g	15 g
			-	**deep colours** approx 3 g	180 g	20 g

2. For 100 g of SILK FIBRE dyed with dyes marked 'PC' in Table II, column 6 (i.e., REACTIVE DYES), the dyeing recipe is as follows:

A				B	C	D
SILK FIBRE	**WATER**	**DIFFUSANT** Avoid pouring neat diffusant on the fibre, i.e., push the fibre to one side and ensure that the diffusant is well mixed with the bath liquor before it comes into contact with the fibre	**LEVELLER Optional** Avoid pouring neat leveller on the fibre	**POWDER DYE** • Dissolve the dye separately in 100ml of warm water. • Remove the fibre from the bath liquor and add the dissolved dye. Stir • Return the fibre to the bath.	**SALT (sodium chloride)** Avoid pouring the salt on fibre.	**SODA ASH (sodium carbonate)** • Remove the fibre from the bath liquor. • Dissolve the soda ash completely in the bath. • Return the fibre to the bath.
100 g	3 litres	30 ml	100 ml	**pale colours** approx 0.05 g	60 g	3 g
			50 ml	**medium colours** approx 0.5 g	120 g	4.5 g
			-	**deep colours** approx 4 g	180 g	6 g

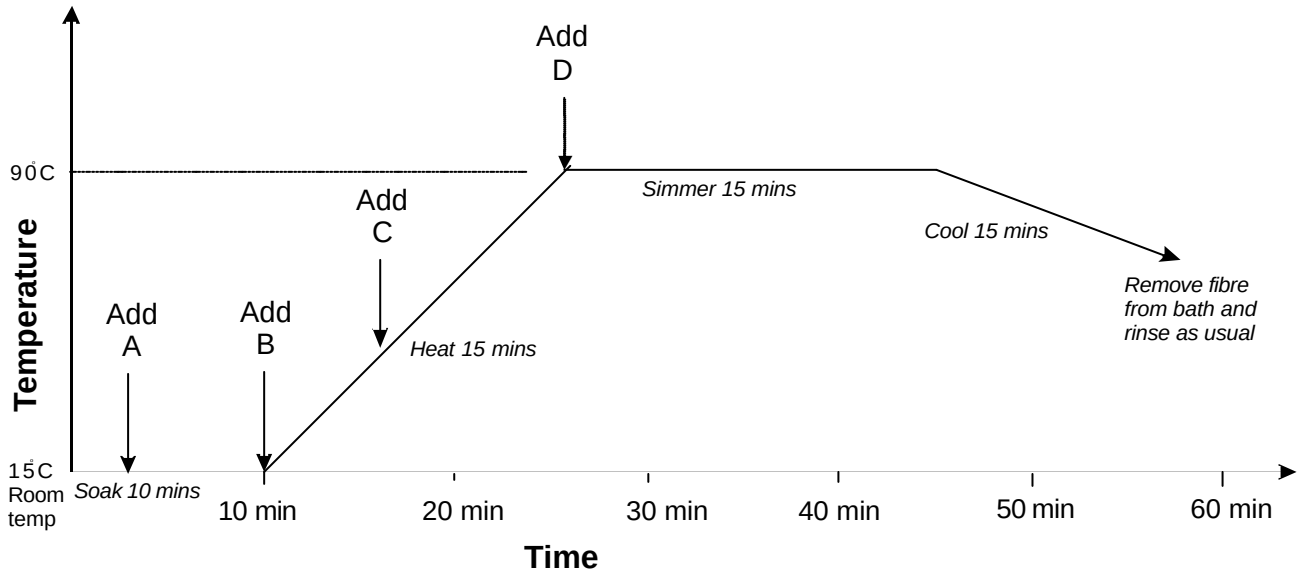
3. For 100 g of PROTEIN FIBRES or NYLON **including SILK** dyed with the dyes marked 'P' in Table II, column 6 (i.e., ACID DYES), the dyeing recipe is as follows:
Also for PROTEIN FIBRES or NYLON **excluding SILK** dyed with dyes marked 'PC'in Table II, column 6 (i.e., REACTIVE DYES), the dyeing recipe is also as follows:

A				B	C
FIBRE	**WATER**	**DIFFUSANT** Avoid pouring neat diffusant on the fibre, i.e., push the fibre to one side and ensure that the diffusant is well mixed with the bath liquor before it comes into contact with the fibre	**LEVELLER Optional** Avoid pouring neat leveller on the fibre	**POWDER DYE** • Dissolve the dye separately in 200ml of hot water. • Remove the fibre from the bath liquor and add the dissolved dye. Stir • Return the fibre to the bath.	**ACETIC ACID 50%** • Add the acid in 5ml portions over a 10 min. period. • Push the fibre to one side to ensure that the acid is well mixed with the bath liquor before it makes contact with the fibre.
100 g	3 litres	30 ml	100 ml	**pale colours** approx 0.02 g	15 ml
			50 ml	**medium colours** approx 0.5 g	15 ml
			-	**deep colours** approx 3 g	15 ml

- Some 'P' ACID DYES vary in strength so much that the dye amount given in recipe 3 above will have to be adjusted as follows:

Dye	Pale colours	Medium colours	Deep colours
Cyclamen	0.01 g	0.3 g	1.0 g
Black	0.05 g	1 g	6.0 g

DYEING PROCEDURE FOR ALL ABOVE RECIPES 1, 2 AND 3



NOTES

- When immersion dyeing pale pastel colours, the powder dye requirement is so small that it is impossible to accurately without high resolution expensive weighing scaleses. Because the ownership of such scales is impractical for craft dyers another strategy for accurately using very small quantities of powder dye must be adopted. The solution is to use the dyes in the same liquid form that is recommended for painting. That is liquid HEATFIX or STEAMFIX dyes. Most of these liquid dyes contain 5g of powder dye per 100g or ml of liquid dye (see the Table 111 recipes).

  Therefore, 0.05g of powder dye is present in 1g or 1ml of liquid dye.
  And given that, 1g or 1ml of liquid dye = 25 drops approximately.
  So then, 0.01g of powder dye is present in 5 drops of liquid dye.

  Measuring the quantity of a known strength liquid dye is the easiest way of dispensing small quantities of powder dye.

- Immersion dyeing pale pastel colours is also difficult from the veiwpoint of achieving an even, not patchy result, particularly when using 'P' dyes. To get the best results the dye bath must start from cold. LEVELLER can also be used to slow the dye uptake, if necessary.

- Another common cause of uneven immersion dyeing occurs when the fabric touches the hot pot bottom for too long. Uneven temperature on the fabric causes uneven dye uptake. This pitfall can be avoided by:
  - keeping the fabric constantly mobile through stirring
  - covering the inside pot bottom with marbles, ball bearings or coin size rounded river pebbles or any other device that will prevent the fabric from having prolonged contact with the hot pot bottom.

- The colours shown on the Procolour silk colour range swatch were painted and steam fixed. However the same colours made by immersion dyeing may vary from the painted equivalent colour because of dye uptake differences in a bath situation. Test colours before starting large-scale immersion dyeing jobs where colour matches are critical. LEVELLER can also help to even out dye uptake differences sometimes found with colour mixtures.

- When the above recipes are scaled up or down then it's important to note the two key relationships within each recipe:
  - The dye amount has a fixed proportional relationship with the fabric weight
    e.g., to get a consistant colour depth, if the fabric weightt is doubled, then you'll have to double the amount of dye irrespective of the other ingredients.
  - The water amount has a fixed proportional relationship with the acetic acid or soda ash amounts, i.e., the pH of the bath should remain fixed irrespective of the fabric or dye amounts
    e.g., double the water amount and you'll have to double the acetic acid or soda ash though the amount of fabric and therefore the amount of dye may be unchanged. The pH of the bath is thus maintained.

- The utensils required for immersion dyeing are:
  - Long rubber gloves
  - A large pot or vessel made of stainless steel or enamelled iron, to contain the dye bath
  - Other metal pots like naked iron, copper aluminium and brass react with some dyes and change the colour, so they're not recommended
  - 2 stirring rods either stainless steel, wood or plastic
  - An adjustable heat source
  - A thermometer is helpful but not essential
  - All utensils coming into contact with the wet fibre should be smooth and not sharp (wet silk is especially vulnerable to chaffing)
  - If you find the volatile fumes from hot acetic acid objectionable, then 15 g of CITRIC ACID or 7 g of AMMONIUM SULPHATE can be substituted for 15 ml of ACETIC ACID 50%.