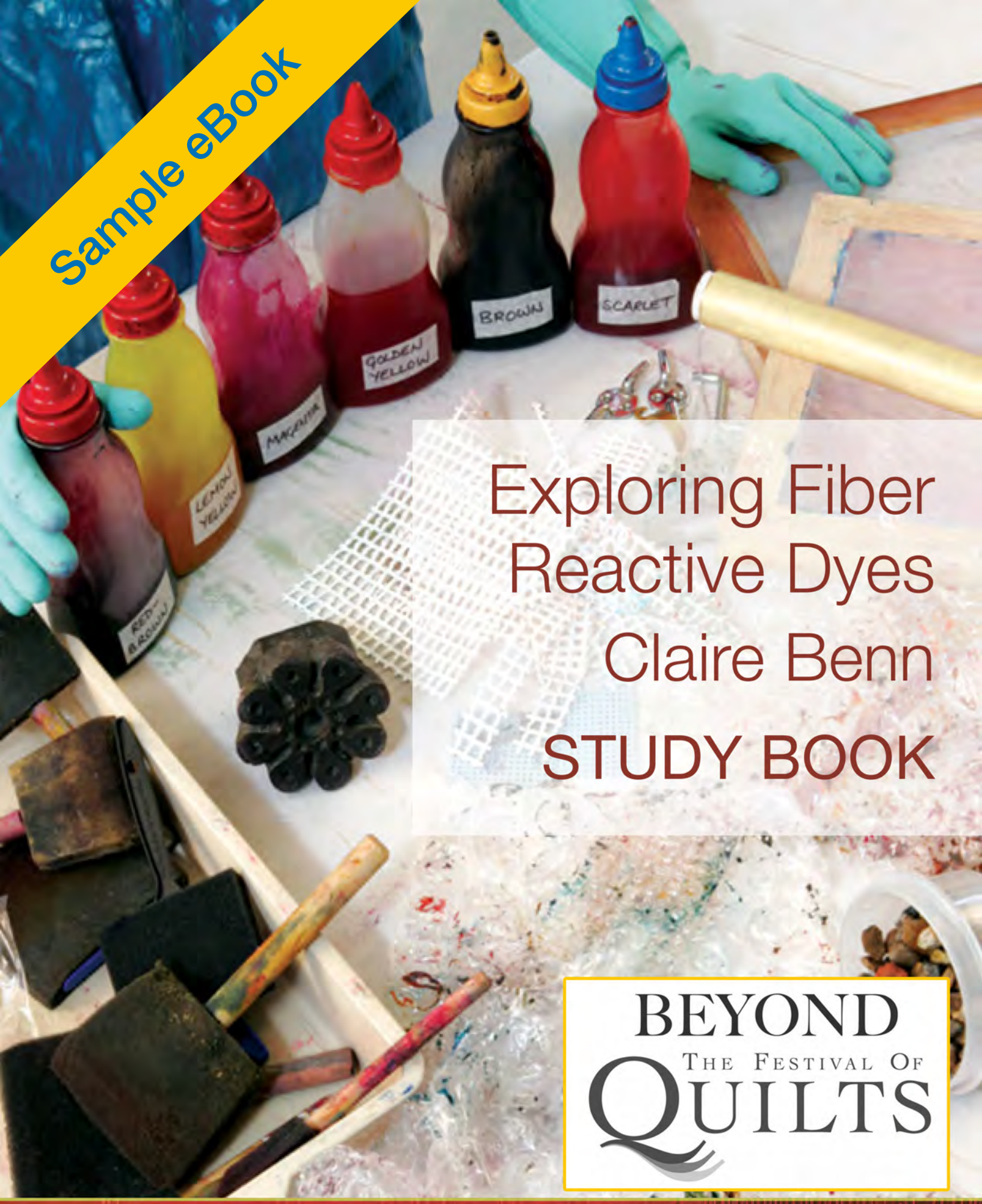

Exploring Fiber Reactive Dyes

Claire Benn

STUDY BOOK

BEYOND
THE FESTIVAL OF
QUILTS

Exploring Fiber Reactive Dyes

Workshop Companion Study Guide

WRITTEN BY

Claire Benn

FILM & EDITING BY

Andrew Galli

galli publishing

Table of Contents

Introduction: Using the Study Guide and Quick Sheets

This ***Study Guide*** is designed to accompany the DVD and online workshop, ***Exploring Fiber Reactive Dyes***. You may wish to have it handy first while you are viewing the video tutorial workshops, and then again in your studio for easy reference. It is included as a digital PDF (eBook) with the online edition and DVD, and is available in print form from Galli Publishing and your DVD dealer.

The Workbook provides the key information on the ingredients for using fiber reactive dyes, along with recipes for immersion work (the bucket) or for using the dyes as paints (bench work). We hope that with the information and guidance we've provided, you'll be encouraged and inspired to either start your journey with fiber reactive dyes, or develop your existing practice. Our goal is to focus is on technical elements that will improve both the quality of your work as well as the pleasure of working with Fiber Reactive Dyes.

In addition to this Study Guide are a set of ***Quick Sheets***. Think of the Quick Sheets as a 'lite' version of the Study Guide, with the most essential information provided. They are shipped in sheet protectors with the Study Guide when you order the bonus print version. They can be laminated for ultimate protection, or put into a ring binder and kept handy with the Study Guide.

Whether your are working in your kitchen with plastic sheets over the table or in a studio dedicated to your craft, the process is absolutely the same. (Claire began her career in cloth without a studio, and sometimes this meant waiting for sunny days in order to work in the garden, or covering the mud room in drop cloths!)

The more you do at home — the more you play and experiment, the more you observe, the more you engage with the process as it happens — the more you'll learn. We encourage you to explore, experiment and make the medium and the techniques your own.

As you work, try to manage your expectations as to the outcome of each piece. Mastery requires practice and even masters don't get it right all of the time! Experimentation, mistakes and accidents are an important part of the creative process. If things do go wrong, try to extract the learning to be had from the 'disaster'; it will help you to avoid it next time… or even do it deliberately! Remember that great-looking cloth can take several processes to get there – probably a minimum of three 'hits' with a more realistic number being five to seven.

As well, "one man's meat is another man's poison". Someone may love what you abhor so consider giving pieces away, swap or trade them or sell them as yardage or fat quarters for quilting and embroidery.

If you do find yourself wanting to delve deeper into any individual process shown, there are many resources out there to hep you, such as:

From Committed to Cloth	From Other Artists
• *Breakdown Printing* • *Tray Dyeing* • *Finding Your Own Visual Language* • *Paper & Metal Leaf Lamination* • *Screen Printing* • *Making your Mark*	• Jane Dunnewold: *Complex Cloth* • Ann Johnson: *Color by Accident* and *Color by Design* • Ruth Issett: *Color on Paper & Fabric*

Do you have to do anything with your cloth?

Not if you don't want to. For some, working with cloth – wet or dry – is both the journey and the destination. The pleasure and satisfaction of simply creating is enough. For others, using the cloth is important… and one of the joys of cloth as a creative medium is its flexibility. Quilts, clothing, embroidery, stitched textiles, home furnishings, accessories, sculpture, dolls, art cloth and even jewelry are potential end uses for your endeavors.

There can be a lot of mystery surrounding the use of Fiber Reactive dyes and the whole dyeing process itself but in truth, you don't need to be a rocket scientist to get great results.

If you can learn the function or role of the different ingredients it will help you to make sense of the process, develop an intuitive and enquiring approach, and give you the confidence to achieve the colors and textures you want.

The information in this workbook isn't 'best practice', it's *my practice*. It represents my preferences and reflects *the environment I work in*. Environment and weather conditions (e.g. humid vs dry) have a great impact on how you mix and use the media, so do pay attention to the technical information as it'll help you to understand the purpose of each ingredient when it's time to make adjustments to suit your environment and practice.

We urge you to follow the recipe and methodology as you observe in the workshop until you feel confident with your results. Once that is done, don't be afraid to start making your own adjustments! In doing so, you will make the media and cloth your own.

Whatever you do, be curious, be bold, be fearless, be adventurous, cut loose and push things to the limit of 'what if…'. This is your cloth, your journey, your creative way.

Above all, relax, breathe and enjoy it!

You'll find there's some common terminology out there in the dyeing world such as 'immersion', 'direct application', and 'surface design'. Let's take a look at these terms:

High Water Immersion — Minimal to Solid Color

High Water Immersion means simply that: loads of water. A few examples are dyes in a bucket or washing machine with a lot of water swishing and loads of movement and agitation. The dye swirls around in the solution and finds its way in to the fibers on its own; it's not being applied directly on to the surface of the cloth.

If the vat isn't stirred or agitated regularly, the cloth will have some texture to it as the dye molecules will pool and the color will strike darker where there's more dye. It's agitation that distributes the dye particles evenly across the cloth, not just the amount of water. Many people who seek a flat or solid color will add a small amount of Urea to the dye bath (to make the bath wetter) and a drop of rinsing agent which acts as an additional surfactant or dye dispersant. For a fail-safe smooth finish of color, the washing machine is the way to go.

For those seeking little or no texture, it's important that the Sodium Carbonate (Soda Ash, the fixative for the dyes) isn't added to the dye bath immediately. That way, with plenty of agitation, the dye particles will be distributed across the cloth before they have a chance to 'strike' or fix. Once this distribution has happened, the appropriate amount of dissolved soda ash can be added to the dye bath/washing machine to fix the dye, followed by more agitation at regular intervals.

Low Water Immersion — Less Texture

It is possible to achieve a smooth or even finish of color (e.g. little or no texture) with *Low Water Immersion,* but there's a lot less water involved. To minimize texture, add Urea as a wetting agent (strange to think that water can be made wetter, but that's what Urea does). It also helps to add a drop of specialist rinsing agent to the vat. These wetting and rinsing agents, combined with LOTS of agitation to regularly distribute the dyes around the cloth, will achieve a smooth finish with minimal texture. All of us are probably concerned about water usage at some point, whether by desire or necessity, so Low Water Immersion may be the way to go.

Low Water Immersion — More Texture

When looking for a varied amount of texture in your cloth*,* Low Water Immersion will do the trick. You can achieve a little to a lot depending on how much dye liquid and poking and prodding is involved. In both cases, the cloth is first pre-treated with a soda soak to ensure that the 'strike' happens as soon as the dye hits the cloth.

For a little texture, add slightly more dye liquid (and some poking and prodding). For a lot of texture, add less dye liquid (and very little poking and prodding). The dyes are then generally applied with a turkey baster or squeeze bottle, directly on to the packed cloth in the bottom of a bucket or tray. The amount of texture you get depends on how much pressing down, poking and prodding you do before applying the dyes. As the dyes seep in and around the packed cloth, things are left to develop in their own way.

Rainbow Dyeing is generally done this way: working in a tray enables you to apply a variety of colors, where you want them. In some ways, because of this ability to put colors where you want them, there's an element of 'direct application' akin to surface design going on. Although you'll find the ingredients are similar for both approaches, the recipes vary slightly, as the method of application and desired end result are different.

Direct Application — 'Surface Design'

This approach involves turning the dyes in to paints (liquid or thickened) and applying them directly on to the cloth with whatever tool you want or need to get the result you're seeking. Depending on the tool used, the dye paint is essentially pushed or laid on to the surface of the cloth – hence the terms *Direct Application* and *Surface Design*.

Batching & Curing

Batching and *Curing* are technical terms for the fixing process that goes on between the dye and the soda ash inside the fibers of the cloth. Some people also use the term *Strike* (e.g., "that struck well"). Details of *Batching* and *Curing* are covered in Section 5, "Bucket Basics", and Section 6, "Benchwork Basics". Although both fixing processes are the same, the approach and way it happens is different. Here are some key things to keep in mind as you proceed:

- **Heat:** 15-35°C / 60-85°F Approximate temperature
- **Time:** Min. 4 hours (most striking in the first 30-60 mins.) Dye molecules strike at a different rate, reds strike faster than blues, etc.
- **Moisture:** It's a wet process, and we need to keep things moist. In a bucket it's find, but when working on a bench, we need to make sure the paints don't dry out too fast. More about that in Section 6, "Benchwork Basics".

Every type of cloth is different; some have fine fibers and others have heavy/thick fibers. Some are tightly woven while others have a loose weave structure. Let's take a brief look at Cloth and its Preparation.

Types of Cloth

Fiber Reactive Dyes are formatted for use with natural fibers such as cotton, linen, hemp, silk and viscose/rayon. They will not work on synthetic fibers such as nylon or polyester, nor are they effective with wool (even though wool is a natural fiber). Be aware that cellulose fibers will take a dye color at a different speed than silk, and therefore, identical dye baths – one for cellulose, one for protein – will yield different results.

How large that difference is depends on the colors used. The general recommendation is to avoid dyeing cellulose and protein (silk) cloth in the same dye bath. Silk tends to be a bit of a dye glutton, holding onto dye particles faster than cellulose fibers (particularly red dyes), so if both types of cloth are dyed in the same dye bath, you won't get a true read on either. You may wish to experiment to observe this for yourself.

Weight & Weave of Cloth

Fine vs. thick fibers: Here we're discussing the weight of the cloth: two identically sized pieces of cloth will weigh different amounts, depending on the thickness of the fibers they're woven from. As such, a meter/yard of medium-weight linen will weigh more than a meter/yard of standard cotton (such as cotton used for quilt-making).

All of the recipes provided in this workbook are to a 'standard' or medium weight of cotton (e.g. Pimatex, Kona, Cotton sateen or similar) or a light-to-medium weight of linen, or a medium weight of silk. If you're using heavier or lighter weights of fabric, do some experimenting — increasing or decreasing the amount of dye accordingly.

Weave structure: With a tightly woven fabric the dyes have to work harder to get inside the fibers. With a loosely woven one, it's easier for the dye to penetrate. Imagine different types of garden fencing: an open 'airy' trellis will allow the elements through easily, whereas a densely woven one will make it harder for the wind and rain to penetrate. It's the same with a weave structure. So, with tightly woven fabrics such as silk-cotton or cotton sateen, if you're immersion dyeing for a smooth finish (as in little or no texture), really mash them about and squeeze the fiber to encourage good penetration. Similarly, when using direct surface application techniques with thickened dye paints, acknowledge that loose, uneven or 'bobbly' fabrics (such as raw silk, silk noil and some linens) will not necessarily generate such crisp marks as can be achieved on smooth, tightly woven cloth.

Fraying will also occur more easily on loosely woven cloth. If this bothers you, then either cut the cloth with pinking shears, or serge the cut edges to prevent fraying.

The Fiber Car Park

Textile Artist Jane Dunnewold suggests imagining cloth as "a car park capable of holding a finite number of cars" and each dye molecule one of the parked cars. When the car park has reached its full capacity, no more cars (dye molecules) will be able to get in (and the fiber will be fully saturated). As soon as the dye comes into contact with Sodium Carbonate, a chemical reaction starts to take place; both elements come together and 'fix' or strike inside the fiber of the cloth. Any left-over dye will not have anywhere to go. And different types of fibers hold different amounts of dye: a fine fiber will hold less dye and saturate more quickly, a thick fiber will hold more dye and take longer to saturate. This is true whether you're working in the bucket or with dye paints on the workbench. So, a fine Silk Pongee/Habotai is a smaller car park than, say, a heavy cotton velveteen fabric, and less dye will be needed to fill up the fine silk than the heavy cotton.

As you work with dyes and different fabrics, it's always worth experimenting and making notes on the differences in dye strikes and colors. In this manner, you'll be able to prepare dye baths and dye paints that are right for the cloth and the color saturation you're looking for. You will go farther with less wasted dye because your recipes will be based upon the Fiber Car Park principal.

Scouring the Cloth

While some cloth is supplied 'PFD' (meaning it's Prepared For Dyeing), others may not be, particularly if bought from high street retailers, market stalls or in exotic countries such as India. It's ***vital*** that <u>any fabric you use is pre-washed to remove size as it can prevent the dyes from penetrating the fibers</u>. The technical term for this is 'scouring'.

Two ingredients are necessary for effective scouring: Sodium Carbonate (commonly known as Soda Ash, which acts as an abrasive) and a rinsing agent. A note about these two ingredients:

Sodium Carbonate: wear a particle mask when weighing/measuring out soda ash, and wear gloves when dissolving it. The dry, fine particles are hazardous if inhaled and repeated exposure on your skin from dissolved soda ash will sooner or later result in an allergy and skin problems. Soda Ash doesn't like being dissolved in hot water, so start by putting the required amount in a mixing beaker and add enough tepid water from the tap to get it dissolving.

Rinsing agents: you can choose to use specialist products such as Synthrapol or Metapex 38 which are designed to (a) assist in the removal of size and (b) trap excess dye particles when rinsing cloth after dye processes. They are also pH neutral, which is a positive thing.

If you don't have access to these products, then try using a detergent designed for delicate fibers or wool, as this can contain similar chemicals. Whichever you use, all tend to generate lots of foam, so avoid over-doing things – even with 'low foam' products!

From this point on, I'll use the term 'rinsing agent', regardless of which type you might be using.

How much can I scour at one time?

Don't over-fill your machine – you want to leave room for the cloth to move freely. Consider loading about 4 yards/meters of a selvedge width of 60"/1.5m, or no more than 6 yards/meters of a selvedge width of 40"/1m.

Which wash cycle, what temperature and how much soda ash?

Choose a 'full wash' cycle for scouring, not a 'quick wash'.

- Full throttle at 90°C with 200ml dry measure of soda ash, dissolved in 2L of warm-to-hot water (not cold or boiling): this recipe is suitable for heavy fabrics such as linen, hemp, cotton canvas or even a medium-weight muslin, as the heat will really help these tough fibers to let go of their sizing. Shrinkage will occur at the same time, which can be useful.
- Hot 60°C / 140°F with 150ml dry measure of soda ash dissolved in 1 liter of warm to hot water (not cold or boiling): suitable for 'normal' types of cotton fabric (e.g. Pimatex, Kona cotton, cotton sateen etc.), or lighter weight of linen. Some shrinkage will occur.
- Warm 40°C / 104°F with 50ml dry measure (3tbsp) of soda ash dissolved in warm water; silk doesn't like alkaline conditions and can have its molecular structure changed at hot temperatures; setting permanent creases or stiffening up. As such, a 40°C / 104°F wash should be suitable for most silks.

Top Loader vs Front Loader Machines?

The method is different for each one. And these days, manufacturers are designing washing machines that run longer cycles, at cooler temperatures and with less water. Here's some advice is for different machines and if your machine doesn't have a 'high water level' button, then add water as instructed below. If it does, then press that button!

Front Loaders:

- Choose your cycle and pre-dissolve sufficient soda ash according to the type of fabric.
- Load the fabric into the machine.
- Start the cycle and let the fabric get wet.
- Put no more than 1tsp of rinsing agent into the dispensing drawer.
- Pour the soda ash through the dispensing drawer (it will take the rinsing agent with it, into the machine.

- To top up potentially low water levels, pour between 2 to 4 liters of warm-to-hot water (as appropriate to what type of fabric your scouring) through the detergent drawer.
- When the cycle has finished, dry the cloth.

Top Loaders:

- If you know your machine runs at low water levels, add between 2 to 4 liters of warm-to-hot water as appropriate to what type of fabric your scouring.
- Add no more than 1 tsp of rinsing agent and the dissolved soda solution to the water in the machine.
- Add the fabric.
- Run the cycle then dry the cloth.

And that's it! The first stage of cloth preparation is done and doesn't need to be repeated. Please remember:

Scouring with soda ash IS NOT the same as soda-soaking your cloth in advance of dye work. The scouring process simply uses soda ash to remove size from the cloth, but it gets washed out when the rinse element of the cycle occur. You cannot soda soak fabric in a washing machine.

Overview of Ingredients related to Fiber Reactive Dyes

Ingredient	Task	Immersion Dyeing	Dyes as Paints (Surface Design)
WATER	Suspension agent	High water + agitation gives flatter finish. Low water + little agitation gives a textured finish with value variations of color	Used to suspend the ingredients when making dye paints
Fiber Reactive DYE	Coloring agent	Always needed! Amounts vary according to color depth sought.	Always needed: I make a standard strength of paint and teach you how to reduce the value of color
SODIUM CARBONATE (SODA ASH)	Fixative for Fiber Reactive dyes	Always needed. If flatter finish is sought, soda is added 30 minutes after immersion. If texture sought, soda ash is added to dye bath immediately or put in the cloth in advance.	Always needed. I prefer to put the soda in the cloth and not the dyes as once soda ash is in a dye paint the chemical bonding starts, and the dyes must be used within 4 hours.
SALT	Fiber relaxant	Highly recommended as it will help your dyes be efficient in terms of penetrating the fibers.	Not needed as you'll be physically pushing the dye into the cloth, e.g. screen printing or painting.
CALGON	Water softener, helps colors to stay bright.	Rarely needed for immersion techniques	Use it if you have hard water.
RESIST SALT 'L' (Also known as Ludigol)	Anti-oxidant, deals with pollutants in air and/or water and helps keep colors bright.	Rarely needed for immersion techniques.	If the water is drinkable, it's not needed. If there's air pollution, then use it.
UREA	Surfactant: a hydroscopic wetting agent.	Helps dye molecules travel more easily in an immersion bath so recommended when less texture is sought, but a higher water level and agitation will also be needed!	A key ingredient for 'Chemical Water (the basis of all dye paints). Its job is to prevent dye paints drying out to quickly or too much once applied to the cloth. The amount needed will vary on humidity levels.
SODIUM ALGINATE	A thickening agent for dye paints.	Not applicable	Added to Chemical Water to create Print Paste, which is the base for thickened dye paints.

The Role of Water

Water (moisture) is a key ingredient in the dyeing process. The two key things to bear in mind are the volume and the temperature.

Water Volumes: The volume or amount of water used in the dye bath/tray will help to determine the texture of the dyed cloth. A lot of water (high-water immersion) combined with a great deal of stirring helps to achieve a smooth, even finish. However, you can achieve fairly flat/solid colors with less water by adding Urea to the dye bath, and adding the soda 30 minutes into the dyeing process. Low-water immersion and 'tray' dyeing generate a more textured result as less water is used and no Urea. The dyes are directly applied on to the surface of the cloth and there's no stirring (you can meddle a little, but more on this later).

Water Temperature: Although fiber reactive dyes are labeled as *Cold Water* dyes, this just means they don't need to reach a boiling temperature to fix. The term Cold Water is used to differentiate them from other dyes such as Direct Dyes and Acid Dyes, which need a much higher temperature. Fiber reactive dyes actually prefer water temperatures between 50-85°C / 122-185°F, so the term "cold water" isn't exactly accurate. More like "really warm water". Heat helps the fibers of the cloth stay relaxed, speeds up the absorption of the dye into the fibers and reduces the fixing/setting time. The result? *Greater take-up of dyes and less waste.* However, don't use boiling or very hot water as if the temperature is too high it may split mixed colors. That said, there's no need to get the thermometer out! As a general rule of thumb, if the water is steaming or feels uncomfortably hot through your gloved hands, it's too hot. Let it cool down a bit or add a little cold water and feel it through a glove again before using it.

When the dyes are used as paints for surface design processes, heating occurs during the batching process. When working with Low or High Water Immersion Dyeing, heat is generated in the dye bath (60°C / 140°F is the optimum temperature).

Room Temperature: Quilt Artist Jette Clover noticed a marked difference in the depth of color she was getting in her hand-dyed cloth once she moved from Northern Europe to Florida. She puts this down to the significant increase in ambient air temperature – her dye baths stayed warm and as such, generated a better strike. So, if you've been using cold water from the tap to mix your dyes you should notice a much better result once you switch to using warm-to-hot water.

The Role of Fiber Reactive Dyes

The fiber reactive dyes are your coloring agents (sorry to be obvious!). The term 'fiber reactive' means that when used in conjunction with Soda Ash, a chemical reaction takes place inside the fibers of the cloth, 'fixing' the dyes into those fibers. You'll also hear the term 'strike' as well as 'fix'. The dyes are dangerous to our health in their dry/powder state so wear a good quality particulate mask rated for chemicals or fine powders when handling dye in its powdered (non-liquid) form. Equally, wear gloves when handling the dyes. If they get on your skin, don't use bleach to remove them! Instead, use a hand cleaner designed for dyes and stains (such as Reduran) to get the worst of it off - the remaining stains will fade after a couple of days.

Once mixed as a warm/hot solution with salt, fiber reactive dyes can be stored for a limited period of about 3 days. If the solution has Soda Ash added to it, the shelf life is between 1-4 hours. Be aware that if you use an old (no soda) dye solution it will have "gone cold" and the dyes will be 'sluggish' and not strike as effectively. If this is the case, consider one of two options:

1. **Use them cold** and accept that the strike may not be as good due to the dyes being 'sluggish'
2. **Warm them up** by adding hot water and accept you're diluting the strength of the mixture if using them in a tray (low-water immersion). For higher water immersion dye baths, add more hot water and agitate.

Purchasing Fiber Reactive Dyes

The dealers who supply this workbook in theory all sell very good quality products, and as such, you should feel comfortable buying dyes from all of them. It may be a good idea to source a small batch of dye from several dealers as each one will have slightly different results. In terms of color range we recommend two sets of basic primaries: 3 "colds" and 3 "warm". Black and Dark Brown are included as colors in their own right and can help you generate 'murky/complex' colors as well as darken or enrich the primaries.

Let's have a look at the chart below:

Warm Primaries	Cold Primaries
Scarlet Red Royal Blue Golden Yellow	Magenta Red Bright Turquoise Acid Lemon Yellow
Good 'Mixers'/'Murking' Colors are; Black and Dark Brown	

Feel free to invest in a larger color range - I do! My two 'extras' include:

Rust Orange: an easy color to mix yourself but I like to have my supplier's version straight from the pot as I know that…

Red-Brown: does lovely things to Rust Orange and yellow

Dye Quantities & Striking Characteristics

How much dye to use is a tricky subject, mainly because it's subjective. It's also important to really note how each dye color has its own peculiarities: some large and fast, some small and slow:

- ***Magenta and Scarlet*** are the 'hares' and 'bullies' in the race to occupy fiber space and as such, some dyers mix them a fraction weaker – 'skinny' measures.
- ***Acid Lemon and Golden Yellow*** are pretty quick to strike but they're easily bullied out of their true nature by all of the other colors. As such, some dyers mix yellows a fraction stronger: 'plump' measures.
- ***Blues and Blacks*** can be slow to strike and grab their space in the fiber (the tortoises) but they do get there. Turquoise can be particularly lazy so it's fairly common for 'plump measures' to be used.

I'll be more specific about dye quantities when we get to specific recipes but ultimately, you'll be deciding on quantities in accordance to the saturation or depth of color/value you're seeking.

The Role of Soda Ash/Sodium Carbonate

As well as being a scouring chemical, Soda Ash or Sodium Carbonate is the fixative that drives a chemical reaction with the dyes, inside the fiber of the cloth. If soda ash is added to the dye solution it has an active life of about 1 to 4 hours and cannot be stored for later use. For direct application or surface design techniques, a cost-effective method is to put the soda ash into the cloth rather than putting it into the dye solution. As such it's a good idea to mix a stock solution of soda ash and keep it in a lidded bucket. It doesn't go off and as long as it's kept covered it won't evaporate.

Wear a particle mask when measuring soda ash as the dry fine particles are hazardous if inhaled. Wear gloves when dissolving and using it to stop it getting on your skin. Soda Ash doesn't like being dissolved in hot water, so start by putting the required amount of soda ash in a bucket and add enough tepid water from the tap to get it dissolving. Then, top up with the required amount of either hot or cold water. The quantity of soda ash increases if large amounts of dye are used but the basic recipe is:

For a soda vat for pre-soaking cloth for surface design or tray dyeing techniques:

- ***50ml dry measure or 3 generous tablespoons of soda per liter of water***.
- I always keep a lidded tub of soda solution to hand, dissolving 500ml of soda ash into 10 liters of warm water. A 5 liter stock bucket may be sufficient for your needs and if so, you'll dissolve 250ml of soda ash into 5 liters of water.

For adding to an immersion vat:
The amount of soda ash needed for an immersion vat will depend on the amount of dye in it. A fail-safe guideline is:

⇨ 1 tablespoon of soda ash per 1 teaspoon of dye used, pre-dissolved in warm water.
⇨ BUT, never use less than 3 tablespoons, even when using very small quantities.

The Role of Salt

I choose to use salt when immersion/tray dyeing as it makes the dye solution more efficient as it helps the fibers of the cloth to relax, and encourages/speeds up the penetration of the dye into the fibers. There are two things to remember when calculating salt;

- the amount of salt in the dye solution is proportionate to the amount of dye you're using. You'll use more dye for stronger, more saturated color and therefore more salt in the dye solution.
- salt amounts are not proportionate to the amount/volume of water (more on water levels in a minute).
- Specific guidance on salt quantities are given in Section 5 (Bucket Basics), but as a general rule, use between 75-100ml of salt per teaspoon of dye used.

I've tested dyeing with and without salt and in my mind there's no question that salt makes a difference to getting a good result. As salt is cheaper than dye, I choose to use it.

Wtare Softener (e.g. Calgon)

Calgon is a brand of water softener, generally available at the supermarket or hardware stores. In the U.K., I can buy it as a powder or a liquid gel, which doesn't need to be dissolved. If you have hard water, adding Calgon or similar will help to keep the colors bright. I don't need to use it when immersion dyeing, but I do use it in my Chemical Water for dye paints.

Anti-Oxidant: Resist Salt L

Also known as Ludigol (liquid) and Metaphos (flakes), this chemical acts as an anti-oxidant and prevents pollutants in the air or water from dulling the dyes. If you're water is potable/drinkable (be it through the tap from the mains supply or from a spring on your property), you probably don't need to use it when immersion dyeing. However, if you're working in a very

urban, and potentially air-polluted environment, consider using it; very little is needed and it's not pricey.

The Role of Urea

Urea is a 'hydroscopic' or wetting agent, which means it constantly attracts moisture to itself from the atmosphere. Its role is to keep things wet and prevent fast drying in direct application techniques.

Urea is generally used:

- In Chemical Water, which is the basis for liquid and thickened dyes that are destined to applied directly to the surface of the cloth.
- In high or low water Immersion vats where solid color or very little texture is sought

So, these are the key ingredients – and the roles they play. I'll move on to provide recipes but before I do, it's worth noting that writing recipes is always a tricky subject - whether it's for dye solutions, French Dressing or Bolognese sauce! How much dye to use is very subjective - what I might classify as a pale color could be very different to what you classify as a pale color! Neither do I weigh my cloth to decide on dye quantities, preferring to make decisions based on:

- the type of cloth I'm using, e.g. fine silk vs heavy linen
- the weave structure (tightly or loosely woven)
- the amount (yardage) of cloth I'm using e.g. a quarter meter or 3 meters
- the strength or depth of color I want

I'm precise when I feel it's important and at other times, 'approximates' are good enough. As you use the dyes you'll discover their characteristics and develop your preferred measures.

Again, let me reiterate that these recipes don't represent 'best' practice, only my practice, which I use in my own studio and when teaching. They aren't written in stone and it's important that you feel free to adapt them and make them your own.