Dyeing Basics

Dyes are fiber specific! You cannot use the same dye for different fiber types; one possible exception is reactive dyes. However, reactive colors results will vary between fibers.

If your fabric is made of…	Use these dyes for best results:
Cotton	Reactive Dyes, Direct Dyes
Linen	Reactive Dyes, Direct Dyes
Nylon	Acid Dyes
Rayon	Reactive Dyes
Silk	Acid Dyes, Reactive Dyes
Wool	Acid Dyes

Types of Dyes

There are many types of dyes; here are the most common for home use

Type of Dye	How it Works	Pros/Cons	Common Brands
Acid Dye	Dye molecule bonds to fiber due to a strong ionic affinity	Relatively easy to use; some acid dyes are non-toxic. Washfastness and lightfastness vary. Some dyes need to be "fixed" using additives or heat.	Colorhue instant-set dye Jacquard silk dyes Kool-aid (for wool)/food coloring and vinegar
Direct Dye	Dye molecules are entrapped within the fiber/fabric structure	The colors of direct dyes are duller than those provided by fiber reactive dyes, and the washfastness is poor - expect anything dyed with them to 'bleed' forever. The washfastness problem can be solved by folowing dyeing with the use of resin treatments such as Retayne, sold by Prochem and Dharma Trading Co.	Rit and similar found in grocery stores, etc.
Reactive Dye	Dye molecule forms chemical reaction with fiber	Good lightfastness and washfastness. Excellent for tie-dyeing. Can be used on many different fiber types; colors vary somewhat between cellulose (cotton) and protein (silk) fabrics. May need soda ash to pretreat fabrics.	Procion is most well known.

Dyeing with Kool-Aid/Food Coloring
From the website: http://www.pburch.net/dyeing/FAQ/drinkmix.shtml

Tie Dye with Kool-Aid

The idea of dyeing with food coloring, either in the tiny bottles mostly used for egg dyeing, or in artificially colored drink mix, is very appealing for one very significant reason: these dyes are safe for use even by children who can't be trusted not to eat their tie-dye projects. However, there is one rule you must remember:

Do not try to dye cotton with food coloring!

Food coloring on cotton is a stain, not a dye, and will not last. You can't make it permanent. If you want to dye cotton, use fiber reactive dye with the how to dye cotton recipe, and don't let your kids eat the dye.

Artificially colored drink mixes can be used for dyeing wool and other protein (animal) fibers, and frequently also nylon. (Some nylon garments are treated with Teflon or other coatings, which prevent dyeing.) They do not attach permanently on cotton or synthetics other than nylon, unless you never, ever wash the item in question.

The answer, then, is to use wool, silk, or nylon. You must also apply heat.

Acid Dyes

Food coloring belongs to the class of dyes known as acid dye. Its attachments to protein fibers, and also to nylon (but no other synthetic), are in the form of ionic and hydrogen bonds. The acid required for the dye reaction is provided, quite conveniently, in the form of citric acid for tartness in the drink mix flavoring. If you use plain food coloring drops, you'll need to pre-soak your fabric or yarn in some plain white vinegar, instead.

No sugar, please! The last thing you want is a gummy mess, but that's what you'll get if you cook *sweetened* drink mix onto your project. Be sure to use unsweetened drink mixes only! (Artificial sweetening is probably just fine, but unsweetened drink mix, to which you are supposed to add your own sugar when mixing drinks, is ideal.) Alternatively, you can use drops of concentrated liquid food coloring, or almost any form of packaged Easter egg dye.

What colors are available?

Many colorings that are legal for use in foods in one country are banned in another; conversely, those dyes allowed in the latter country may be banned in the former. In the US, the list of legal synthetic food dyes is short:

dye name	F D & C food dye number	Colour Index number	E or INS number*	frequently associated flavors (check ingredients lists)
allura red	red dye #40	16035	E129	cherry, strawberry
brilliant blue FCF	blue #1	42090	E133	blue raspberry, blue moon berry
sunset yellow FCF	yellow #6	15985	E110	
indigotine	blue #2	73015	E132	
fast green FCF	green #3	42053	INS 143	
erythrosine	red #3	45430	E127	
tartrazine	yellow #5	19140	E102	lemonade

(*E numbers are European food additive numbers, being replaced by INS numbers, which are international but are largely the same as E numbers.)

Safety warnings

How can there be any safety hazards, with food-safe dye?

First, never breathe the drink mix powder. Breathing dye is unhealthy; breathing almost any powder is unhealthy.

Second, don't let your children learn, from this food-safe experiment, that it is okay to taste your dyes! You may think that this is silly, but my young son developed the appalling idea, from our early chemistry experiments together, such as growing crystals from salt and sugar, that it was okay to taste chemicals. Fortunately I was watching closely the time he decided to taste a non-food-safe experiment!

Project

This project is designed for use with children; it is not optimized for art use, as food coloring is not the most lightfast of dyes (that is, you may find that it fades badly after a year or so).

1. **What to dye.** First you need to select an appropriate dyeable - wool yarn, nylon fabric, silk scarf. You can buy silk scarves for a couple of dollars each by mail order from companies such as Rupert Gibbon & Spider and Dharma Trading Company; see Sources for Dyeing Supplies. Do not choose anything containing a cellulose fiber such as cotton, rayon, or linen, nor any synthetics other than nylon, such as polyester or acetate.
2. **Choose your dyes.** Select your favorite colors of unsweetened artificially colored drink mix. Plan on about one packet of drink mix per ounce of fiber, if you like intense colors.
3. **Pre-soak your fiber.** If you are using a drink mix that contains an acid, such as citric or malic acid, for tartness, dampen your fabric or yarn with water, or you can use water with some added vinegar, just to be sure. If you are using pure food coloring or egg dye, dampen with plain white vinegar, instead, mixed half-and-half with water. Squeeze out excess water and vinegar, leaving your fiber wet.
4. **Tie.** (Optional.) For a true tie-dye project, you may use rubber bands to tighten the fabric where you want it to remain white. Many people prefer dyeing with no ties at all, however. Since you are applying your colors directly, you can get quite nice designs with no need for the ties.
5. **Select a dish.** Here's where this form of dyeing becomes especially convenient. There is no need to devote a dish solely to dye use, since these dyes are food-safe; you can use any kitchen container that is suitable for microwaving. Choose one as wide as will fit in your microwave oven conveniently. Arrange your damp material in the dish.
6. **Add dye.** Sprinkle on your drink mix or food coloring in a pleasing rainbow pattern. You can use the drink mix either dry (it will dissolve on the wet fabric) or dissolved in a very small amount of water. Remember that you don't want to put opposite colors next to each other, such as red next to green, orange next to blue, or yellow next to purple, as you will end up with a muddy brown if you do. Place colors in rainbow order. After covering the top layer, use gloved hands, or tongs or other kitchen implements, to turn the fabric or yarn over in the dish, to do the same to the other side(s).
7. **Cover the dish.** Use a lid, plate or microwavable plastic wrap to seal the dish tightly. This will trap steam to ensure that all parts of the fabric get treated, and prevent one region from drying out and burning before the rest is even hot.
8. **Heat in the microwave.** (Obviously, this part is to be done only by adults or teens, though young children can do the dye application.) Watching closely the entire time, heat for anywhere from fifteen seconds to a minute or two, until the material is hot. You will see the steam start to inflate the plastic wrap, and condense inside the plastic wrap; that is when you must press "STOP". Let it rest for a minute, then heat again. Alternatively, heat for five minutes on reduced power (20%), but **be sure to watch constantly** . The danger is that overheated fiber can actually catch on fire in the microwave, if it is allowed to get too dry. It must get quite hot in order for the dye to attach permanently to the fiber, however. If you do not have access to a microwave oven, you can use a vegetable steamer and steam for half an hour, instead.
9. **Allow to cool.** The time spent gradually cooling will allow more bonding to occur.
10. **Rinse.** Using cool water, rinse until the water that runs off no longer contains dye.
11. **Laundering.** When laundering becomes necessary, wash in cool water on the delicate cycle, or hand wash; be sure to follow any care instructions for wool.