

**Procion Dye Demo, Rick Steiner (steinerrw@yahoo.com) and Richard Vogt (vogt@biol.sc.edu)  
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Procion dyes form a chemical bond with cotton fibers (cellulose based fibers; also dyes; silk but not wool). Treating the fiber with soda ash activates the fibers allowing the dye to bind.

Fiber can be soaked in soda ash, dried and stored for later use, or soda ash can be mixed with the dye for immediate application (soda ash limits the life of the dye to a few hours at most, and changes the dye properties over that time. Binding of dye to fiber takes time (increasing over hours), and requires that the fiber be moist (i.e. not dry). The dye is fixed to the fiber in hot water (140°F) requiring several cold water washes prior to the fixing heat treatment. Synthrapol SP is included in the cold water washes to bind dye, preventing it from staining the fiber during washes.

Dye stocks are dissolved in water with urea

Dye is combined with a thickening agent to form a paint-like paste; color intensity is adjusted by the proportion of dye:thickening agent (1 part each for intense color); consistency of the thickening agent:dye mix can be diluted using urea/water (thinner dye runs more).

**Overview...**

1. Wash fiber (weak soda ash and Synthrapol) and soak in soda ash (9 Tbs / gallon); spin dry and air dry, store.
2. Mix dye and thickener (print paste) and paint away, mixing colors as desired. Keep damp (wetter leads to more running). Works best above 70°F.
3. Cure: 4-8 hrs (cover with sheet of plastic).
4. Wash multiple times in cold water containing Synthrapol SP, Set @ 140°F.

**About Procion Dyes.** "Fiber reactive dyes have an electron bond which is very strong, allowing the fabric to withstand repeated washings and strong light."<sup>(1)</sup> These are fiber-reactive dyes that bind to charged areas on cellulose fiber. These charged or activated areas are formed by treating the fiber with soda ash. Might even be relatively safe.

"The first fibre-reactive dyes contained the 1,3-5-triazinyl group, and were shown by Rattee and Stephen to react with cellulose in mild alkali solution. No significant fibre degradation occurred. ICI launched a range of dyes based on this chemistry, called the Procion dyes."<sup>(2)</sup>

**About Soda Ash.** Soda ash is also known as sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>). CO<sub>2</sub> naturally dissolves in water (H<sub>2</sub>O), and with water forms carbonic acid (H<sub>2</sub>CO<sub>3</sub>). Carbonic acid spontaneously converts to bicarbonate (HCO<sub>3</sub><sup>-</sup>). HCO<sub>3</sub><sup>-</sup> is a natural substance in us, helping to neutralize stomach acids when they enter the intestine and maintaining a neutral pH throughout the body. HCO<sub>3</sub><sup>-</sup> converts to CO<sub>3</sub><sup>=</sup>. On a scale of pH, CO<sub>3</sub><sup>=</sup> is very basic. CO<sub>3</sub><sup>=</sup> comes dry as Na<sub>2</sub>CO<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub> dissociates in water to form Na<sup>+</sup> and CO<sub>3</sub><sup>=</sup>.

Sodium carbonate is used as a water softener, in photographic developers to maintain a basic pH and as a cleaning agent. A solution of sodium carbonate feels slimy or slippery.

Dharma Trading Company P.O. Box 150916 San Rafael, CA 94915 800-542-5227 www.dharmatrading.com	PRO Chemical and Dye P.O. Box 14 Somerset, MA 02726 800-228-9393 www.prochemical.com	Recommended Reading: <i>Color by Design: Paint and Print with Dye</i> , by Ann Johnston ISBN 0-9656776-1-3 2001
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(1) *Color by Design: Paint and Print with Dye*, by Ann Johnston  
 (2) <http://www.chm.bris.ac.uk/webprojects2002/price/reactive.htm>

**Procion dyes come as either pure (17+ single dyes) or combined (multiple dyes) colors.**

<b>Dyes (Vogt):</b>	Yellow MX-8G	Blue MX-G
<b>(ProChem)</b>	Red MX-8B	Black MX-CWNA

**1. Wash: (dilute, make fresh)**

water (140°F)  
soda ash (1/2 tsp / # fabric)  
Synthrapol SP (1/2 tsp / # fabric)

**2. Activate: (can store and probably reuse)**

soda ash (9 Tbs / gallon; or ~ 1/2+ cup /gallon)  
water (warm)

**3. Print paste (thickener): (good months? in refrigerator)**

water (3 cups)  
Granular Urea (maintains moisture) (6.5 Tbs)  
Metaphos (sodium hexametaphosphate, water softener)(1.5 tsp)  
Sodium alginate SH (thickener) (6 tsp) (called "Prothick SH" from ProChem)  
(might take hrs to overnight to completely dissolve, loose lumps)

**4. Dye stock: (good months in refrigerator)**

water (1 cup) (warm, but lower than 95°F)  
Granular Urea (2 Tbs)(increase to 4 Tbs if dye needs help dissolving)  
Dye (2 Tbs)

**5. Dye thinner: (make fresh)**

water (1 cup)  
Granular Urea (7 tsp; or ~ 2+ Tbs)

**6. Final Washes:**

Synthrapol SP (1 tsp/gallon hand wash; 1-4 Tbs in machine)  
water (warm, <95°F))

**Set:**

Synthrapol SP  
water (140°F)