

## From yahoo answers; How does a fiber reactive dye work?

Fiber reactive dyes form permanent covalent bonds with the cellulose fiber in cotton or with the protein molecule in silk. I will use Procion MX (dichlorotriazine) dyes with cotton as an example.

First, the high pH of the soda ash (or other base) activates the cellulose, removing a hydrogen ion and creating a cellulosate anion. Following that, the cellulosate anion attacks the carbon adjacent to one of the chlorines in the dichlorotriazine molecule. Finally, the chlorine is lost and the covalent bond is formed. See the drawings in the links below.

Compare to the much looser bonds that are formed between the direct dye in an all-purpose dye, such as Rit. The looser bonds cause Rit dye to bleed in the laundry and to fade quickly. The covalent bonds that fiber reactive dyes form enable them to stay bright for years.

## Why can't fiber reactive dyes be made more than a couple of days in advance?

I think it has something to do with the fact that the fiber reactive dyes are an organic compound.

- 3 years ago
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[Paula B](#)

### **Best Answer - Chosen by Asker**

It has nothing to do with the fact that they are organic compounds. Anything that contains carbon is an organic compound! What it all has to do with is the reactivity of the dyes. They are not only capable of reacting with cellulose; they can also react with water (hydrolyze). Once they have reacted, they cannot react again, so they become useless for dyeing cotton.

It's not entirely true that you can't dissolve the dyes more than a couple of days in advance, though. That's just a good rule to follow so that you don't mix the dyes up weeks in advance and then find that they don't work. The fastest-to-react dyes are the dichlorotriazine dyes, which are known as Procion MX dyes. If you dissolve them in pH-balanced water, they will stay good for at least a week or two at room temperature, and weeks longer than that if they are stored in the refrigerator (since cooler temperatures reduce the reaction rate).

However, if the dyes have soda ash already mixed in with the dye, then you should use them within half an hour or so of mixing the dyes with water, because the high pH of the sodium carbonate encourages the dyes to hydrolyze quickly. Once even a drop of soda ash gets into the dye solutions, they will not last even half a day. Some tie-dye kits contain the soda ash in a separate bag to be used as a presoak, but others contain it already mixed in with the dye.

The soda ash (sodium carbonate) is required to activate the cellulose in the cotton so that it can attack the dye. See the drawings of the reactions in the links below.

Other types of fiber reactive dye are less quick to react than the dichlorotriazines, so they can be stored for months after dissolving them in water. Some can even be purchased already dissolved in water, but many of

these require such high heat to react that they are usually steamed to set them in the fabric. These include the vinyl sulfones (Remazol dyes), monochlorotriazines (Procion H dyes), and monofluorotriazines (Cibacron F dyes).

The dyes are actually made a year or more before they are used. They are made in the dye factory. What you should not do more than a week or two before use is dissolve the dyes in water. Even if the dyes are not dissolved in water, though, they will still go bad a year or two after purchase, due to gradually hydrolyzing in the jars. They will go bad very quickly if stored in a hot place. If you leave the tie-dye kit in your car with the windows rolled up in the sun, they will hydrolyze ("go bad") in just one day.

### **Source(s):**

About Fiber Reactive Dyes:

<http://www.pburch.net/dyeing/fiberreacti...>

Chemical reaction for a dichlorotriazine (fiber reactive) dye with cellulose:

<http://www.pburch.net/dyeing/dyelog/B106...>

I'm wondering if you could explain the chemistry behind why cotton can't be dyed at an acidic pH:

<http://www.pburch.net/dyeing/dyelog/B106...>

Refrigerating dyes?:

<http://www.pburch.net/drupal/?q=node/198>