Name: _____ Period: ____ Date:_____

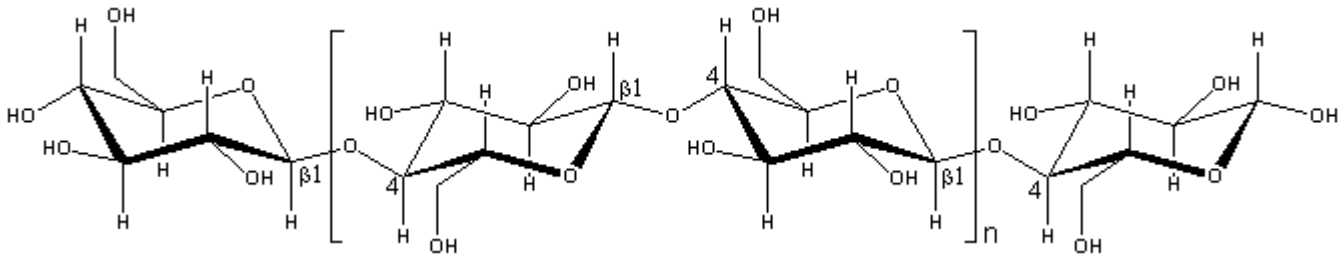
Tie Dye Lab

Introduction: Some dyes only stain the cloth, and wash out a little each time the cloth is laundered. High Quality dyes (fiber-active dyes) actually chemically (covalent) bond to the molecules of the fabric and can never be washed out.

Cotton is made of long strands of **cellulose** molecules, all twisted together. Cotton is ideal for dying because the fibers are naturally hollow, and the dye molecules will form bonds on both the inside and outside of the fiber. If you put molecules of dye and cotton together, very little will happen until the atoms on the surfaces of the molecules are prepared for bonding. This can be done by either increasing the temperature or the pH of the fiber and dye.

In this lab, we will do the former, increasing the pH by soaking the fabric in warm water, which causes the releases a H atom from the cellulose molecule. The removal of the H atom leaves the cellulose molecule with O atoms that do not have stable octets. As a result, the dye can bond to the cellulose molecule at the site of the removed H atom. After the dye is applied, it is allowed to react in a desirable host environment for up to 24 hours. After this time, the bonding sites on the cellulose should be saturated with dye molecules. Excess dye molecules that have not bonded permanently are washed away using warm water rinse and a dye-carrying detergent.

Below is a piece of a cellulose molecule. Circle each possible bonding site with your teacher.



Purpose: To observe the covalent bonding when tie-dying.

Safety: Wear Apron!

*Use microwave to heat H_20 in big beakers.

Procedure:

1. Prepare your shirt by wetting them with warm water.
2. Tie the shirt tightly (with rubber bands) according to the design you want.
3. Prepare the dye by adding warm water (either in the bucket or in the bottle)

For bottles fill to the line and for buckets use 1000mL of water for half a bag of powder dye or for quarter of liquid dye.

4. Place your tied shirt in the bucket or use bottles of different colors.
5. Let sit for 20 minutes or overnight.
6. Rinse the clothes in warm water then gradually cooler water until water runs clear.
7. Wash with water with little detergent
8. Hang to dry or bag it (Bring plastic bag to school tomorrow)
9. Clean containers (used for dye bath).

Data: Draw your shirt design & indicate colors used

Questions:

1) What type of bonding is present between fabric and the dye?

2) In a covalent bonding what happens to electrons?

E.C: Why don't we dye polyester?