Fabulous Fabrics

Teacher Answer Key

Name:_____

Date: _____

Pre-lab Questions

1. Use this space to copy the two lists of fabrics you made as a class. Label each list with a category heading.

Students should copy the list made in class with headers for natural and synthetic fabrics

2. With your group, brainstorm some variables involved in dyeing fabric. List your ideas here.

Look for a good-faith effort in line with your expectations given how much you've covered variables in class so far.

3. With your group, brainstorm how you can tell the fabrics apart. List your ideas here.

Look for a good-faith effort in line with your expectations given how much experience they've had with observational science in class so far.

Teacher Key To Fabric Dyeing Patterns

Name of fabric	Natural or synthetic?	Actual dye rating: acidic solution	Actual dye rating: basic solution
Acetate (polar, not charged)	Synthetic	Low to no absorption	Low absorption
Cotton (polar, not charged, but because there are the OH groups, it absorbs dye – acetal groups have methyl group, which is not as "sticky")	Natural – plant derived	Moderate to high absorption	High to very high absorption
Polyamide (polar, not charged)	Synthetic	High absorption	Low to no absorption
Polyester (polar, not charged)	Synthetic	Low to no absorption	Low absorption
Polyacrylic	Synthetic	Low to no absorption	Low absorption
Silk (protein, positively charged groups)	Natural – animal derived	Very high absorption	Low absorption, color is washed out/muted
Viscose (negatively charged; modified cellulose with carbon disulfide groups)	Natural – plan derived	Low to moderate absorption	High absorption
Wool (protein, positively charged groups)	Natural – animal derived	Very high absorption	Moderate absorption, color is washed out/muted

Discussion Questions

1. In question 2 above, you listed some variables involved in dyeing fabric. Which variable(s) did you test in today's lab?

pH and fiber/fabric type

2. How did pH affect the dyeability of each of the fabrics? What patterns, if any, did you notice?

Patterns to notice: - Synthetic fibers will dye better with basic dye, with the exception of spun polyamide (nylon). This is because nylon's structure has a slight positive charge, unlike the typical synthetic fibers, which are slightly negative. - Animal-derived natural fibers will dye better with acid dyes. - Plant-based fibers are harder to predict, as they are typically dyed with neither acid nor basic dyes

3. Looking at your results, what was surprising?

4. In your own words, what is green chemistry?

Green chemistry is the design of products (made through chemistry) and chemical processes with an emphasis on reducing or eliminating waste and harmful chemicals while being efficient with energy and output.

5. Imagine you are a green chemist responsible for manufacturing a shirt to sell to eco-conscious consumers. Your shirt must be dyed with the same red dye as found in Kool-Aid. Which fabric would you choose to make your shirt out of? Would you dye the fabric in acidic or basic conditions? Justify your answers.

Students may answer either cotton or polyester. When justifying their answer, students should should specifically link the color of the shirt with the acidic/basic dyeing environment and should cite one or more principles of green chemistry.