Making Soap - Saponification

Objectives

The objective of this laboratory is to make lye soap via the saponification reaction.

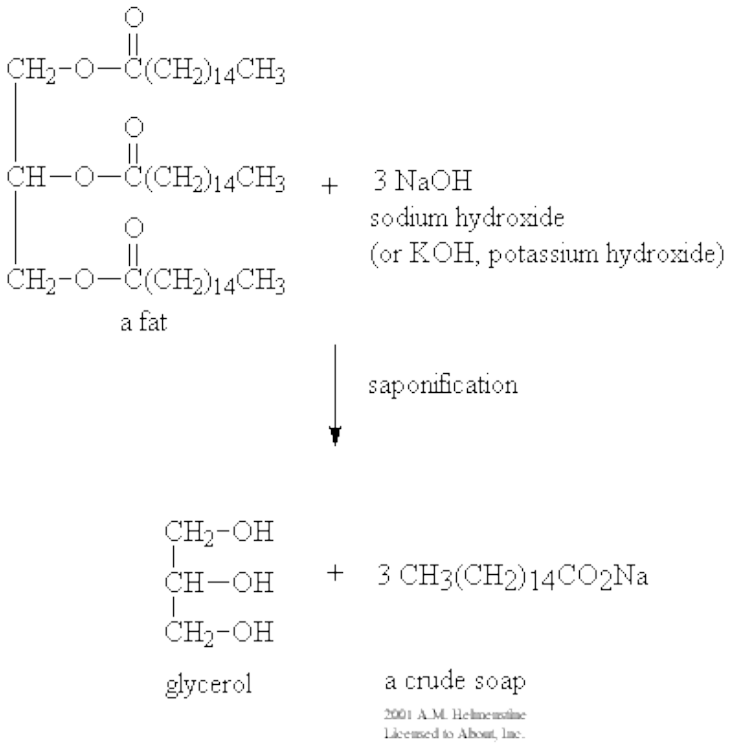
Background

Soap making has remained unchanged over the centuries. The ancient Roman tradition called for mixing rain water, potash and animal tallow.

Making soap was a long and arduous process. First, the fat had to be rendered (melted and filtered). Then, potash solution was added. Since water and oil do not mix, this mixture had to be continuously stirred and heated sufficiently to keep the fat melted. Slowly, a chemical reaction called **saponification** would take place between the fat and the hydroxide which resulted in a liquid soap. When the fat and water no longer separated, the mixture was allowed to cool. At this point salt, such as sodium chloride, was added to separate the soap from the excess water. The soap came to the top, was skimmed off, and placed in wooden molds to cure. It was aged many months to allow the reaction to run to completion.

All soap is made from fats and oils, mixed with alkaline (basic) solutions. There are many kinds of fats and oils, both animal and vegetable. Fats are usually solid at room temperature, but many oils are liquid at room temperature. Liquid cooking oils originate from corn, peanuts, olives, soybeans, and many other plants. For making soap, all different types of fats and oils can be used – anything from lard to exotic tropical plant oils.

Saponification Reactions: **Fat + Lye → Soap + Glycerol**



Procedure

Safety

Be sure to exercise caution when dispensing the 9 M NaOH. If the chemical comes into contact with your skin, immediately rinse with water for a minimum of fifteen minutes and notify your instructor.

Personal Protective Equipment (PPE) required: safety goggles, lab coat, closed-toe shoes

Materials and Equipment

Materials: warm olive oil (preheated by instructor), 9 M sodium hydroxide solution, food coloring, assorted fragrances, stearic acid

Equipment: tall 250 mL beaker, PLASTIC stirring rod, glass pipets and pipet bulbs

1. Your instructor has a beaker of olive oil, preheated to 35°C, at the front bench. Pour 10 ml of the warm oil into a tall 250 mL beaker.

2. Prior to beginning the reaction, choose your fragrance. You may choose one of the following: holiday candy, island coconut, yuzu, energy, lavender, white tea & ginger, fresh cut grass, plumeria, lilac, oatmeal milk & honey, sandalwood, relaxing, cedarwood, cinnamon, amyris, vanilla.
   Add 1-2 drops of desired fragrance, using the pipet provided at front bench; do not mix fragrances.

3. Add 3 ml of 9 M sodium hydroxide solution to the beaker. This is approximately two full dropper squirts.

4. Use the plastic stirring rod to mix. You must stir for 20-45 minutes; you may choose to take turns with your lab partner. The mixture will slowly become smoother and more opaque; it should thicken to a pudding-like consistency.

5. After approval by your instructor, add 2-3 drops of desired food coloring. Stir.

6. Add a dash (approximately 1/8 teaspoon) of stearic acid. This will serve as a hardener for the liquid soap. Stir.

7. Pour into chosen mold shape. Label with your names and lab section number.

8. After pouring into the mold, the process will continue on its own. The soap will heat up and liquefy again, then cool off slowly, harden and dry. So, the soap must be left undisturbed for at least 12 hours. You will pick up your finished soap in lab next week.