Preparing Soap

Introduction

Earliest recorded evidence of the production of soap-like materials dates back to around 2800 BC in ancient Babylon. However, even as recently as 1850, bathing regularly was not a common practice! Homemade soaps were harsh, and commercial soaps were expensive. Now, soap is produced on a massive scale thanks to synthetic ingredients, selling over \$1.6 billion worth of liquid and bar soap in 2007.

In this lab, you will prepare soap using a similar procedure that was used for early soaps. Instead of animal fats, you will use vegetable shortening; instead of using ashes from a fire, you will use sodium hydroxide. Ethyl alcohol is used as a catalyst to speed up the process so that the reaction can take place at a lower temperature. This activity will take 1-3 days.

Materials

ethyl alcohol paper cups pH paper

Equipment

beakers, 100-mL (2) graduated cylinder, 10-mL hotplate scented oil sodium hydroxide, 6M [NaOH] vegetable shortening or lard

stirring rod thermometer

Safety Considerations

- Sodium hydroxide is toxic and damaging to the eyes and skin; you must wear goggles and gloves for the entire lab.
- Sometimes chemicals from previous labs still remain in glassware and on other lab equipment; wash all lab equipment before and after performing this lab.
- Wash your hands thoroughly after completing this lab.

Procedure

- 1. Obtain 20 grams (about 20 mL) of solid fat and place it in a 100-mL beaker
- 2. Using a hotplate, gently heat the solid fat until it has melted. Once it had melted, remove it from the hotplate and set it aside.
- 3. Carefully combine 10 mL of 6 M sodium hydroxide and 10 mL of ethyl alcohol in a second 100-mL beaker.
- 4. Using a hotplate, gently heat the second beaker to about 35°C.
- 5. Once the melted fat has cooled to about 45°C, slowly pour the sodium hydroxide solution (second beaker) into the melted fat (first beaker) while stirring constantly with a stirring rod.
- 6. Stir the combined ingredients until the saponification reaction is complete. This process should take around 5-10 minutes.
- 7. If you would like to add a scent to your soap, add about 5 drops of a scented essential oil at this time. Mix it in well!
- 8. Pour the soap slowly into a paper cup, which will serve as your mold.
- 9. Label your cup with your name and allow the soap to set for 1-3 days.
- 10. After the soap has solidified, test its pH using pH paper. Note the color of the paper and



its corresponding pH value.

Clean-up

- 1. Dispose of any leftover solutions in the sink. Flush with lots of water!
- 2. Clean all used lab equipment with soap, water and a test tube brush.
- 3. Return all equipment to its proper location.
- 4. Wipe down your lab area and wash your hands before leaving the lab.

Questions

- 1. Test your soap product by using it to wash your hands. How well does it work?
- 2. What was the pH of your soap? Was it acidic, basic (alkaline) or neutral?
- 3. There are some obvious differences between your soap and soap you can buy at the store. What are two reasons that commercial soap is different from your soap?
- 4. Sodium hydroxide (lye) is used as a drain cleaner to remove clogs made of grease and hair. Based on how sodium hydroxide turns fat into soap, how do you think it works to clear drains?
- 5. List one way you could change this lab and describe how your results might be different.