Micelles to the Rescue: How Soap Removes Debris
Lesson Summary

Introduction
Soap is an important part of our daily life, however how soap works is a mystery to many students and often taken for granted. This lesson is designed for a teacher to use within context of a larger unit on mixtures and solutions. The lesson will teach students how to make a primitive soap, understand the basic chemistry behind soap, conceptualize how soap removes debris via micelle aggregation, and identify what hard water is and its effect on micelle aggregation.

Lesson Delivery
This lesson is meant to take place for three separate sessions. It's been broken down by session one, two, and three. However, these sessions do not need to be taught consecutively. The teacher can implement session one a few weeks before they begin session two and three. This will give the soap time to cure and its pH to decrease to a level that is less hazardous.

Alternative Option to Making Soap
If a teacher does not feel comfortable having their students use a high molarity of sodium hydroxide or would like to deliver this lesson in three consecutive days, there is another option. You can prepare a liquid soap and call it "homemade" by grating 2 grams of Ivory bar soap and placing it in 1 L of water. Stir the solution vigorously for 5 minutes and let sit for 15 minutes until the 2 grams of Ivory soap dissolve. Place the liquid soap in droppers for each group to use during session three.

Material List
A separate material list has been created for the lesson.

Lesson
Session One:
During session one students will follow a soap making procedure. Students will have very limited knowledge of chemistry because this lab will be performed very early in the semester. The focus should be on learning basic lab skills. When the lab is complete, each group will have its own cup of soap which will cure for four to six weeks. This will lower the pH of the soap as well as give students time to learn enough chemistry to fully understand "Micelles to the Rescue: How Soap Removes Debris." See "Alternative Option to Making Soap" if you do not feel comfortable having students make soap.

Session Two:
Session two consists of two hook activities and a PowerPoint lecture. It may take more than one class period to complete the activities in session two. The hook activities will expose students to the effect soap has on water. The first activity will contrast hard and soft water; the second will show the effect soap has on the surface tension of water. Discussions should follow after each hook activity. After the hook discussions students will be given a handout for taking notes. The handout matches the PowerPoint presentation. There is a vocabulary assignment that can be used as an in-class assignment or be assigned as homework.

Session Three:
Session three will give students an opportunity experiment with the soap they created earlier in the semester. Students will investigate how their homemade soap compares to store bought commercial soap. They will investigate how each soap lathers and their pH differences, how hard water effects each soap, and as how each removes grease. Students will also design their own experiment to see how temperature effects the effectiveness of soap. There are post lab questions for students to consider how businesses market their soap.