Micelles to the Rescue: NAME: _____
How soap transports debris

Day Two:
Lesson on Soap and Micelles

Hook Activity 1:

1. Have four stations set up with two 2000 mL beakers at each station and one pan. Label one beaker "A" and another beaker "B." Have liquid dish soap at each station.
2. The "A" beakers will only have tap water in them, the "B" beakers will have tap water with a saturated amount of Calcium Chloride in them. Both beakers should have roughly 1000 mL of water in them. Do not tell students what is in each beaker. The pan will have a mixture of olive oil and dirt.
3. Students will go to a station, get their hands oily in the pan, then put one drop of dish soap on each hand. DO NOT RUB HANDS TOGETHER. Try to get soap as evenly distributed as possible without rubbing hands together
4. Place one hand in "A" and the other hand in "B". Move fingers around in the water to try to get your hand clean. After one minute take both hands out and see which one is the cleanest!

Hook Activity 2:

1. Each group fills a 100 mL beaker with 50 mL of water and shake pepper to cover the surface.
2. Place a drop of soap on the water. Something will happen. WHY?!

Answers to student questions (questions on next page):

1. There are no noticeable differences between the water in bucket "A" and bucket "B." If the calcium carbonate isn't completely dissolved or it is supersaturated, students may notice it at the bottom of the bucket or floating in the container.
2. Students should see a lot of lathering and their hands should get nice and clean. The water should have a lot of soap suds in it.
3. Students should have a difficult time getting the oil and dirt off of their hands. The soap shouldn't lather well or make many suds in the water.
4. Students should report that water in bucket "A" cleans their hands better than bucket "B."
5. Answers will vary. However, students should try to make connections with intermolecular forces in their responses.
6. Drawing will vary but should resemble a micelle composed of amphillic molecules.
7. Answers will vary.

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Questions for Students:

1. Before washing your hands note any differences you see between the water samples (if any):
   _____
   _____
   _____

2. After washing your hands in beaker "A" write down some of your observations below. How well did it remove debris, did the soap lather well (lots of bubbles), what did the water look like after you washed in it? Etc.
   _____
   _____
   _____
   _____
   _____

3. After washing your hands in beaker "B" write down some of your observations below. How well did it remove debris, did the soap lather well (lots of bubbles), what did the water look like after you washed in it? Etc.
   _____
   _____
   _____
   _____
   _____

4. Which water ("A" or "B") seemed to 'clean' better?
   _____

5. Why do you think it 'cleaned' better? Support your explanation using ideas from our unit on chemical solutions.
   _____
   _____
   _____
   _____
   _____
   _____

6. Go online and look up a diagram of a *micelle* and draw a simple diagram in the box below:

7. Why do you think the pepper did what it did after you added a drop of soap?
   _____
   _____
   _____
   _____
   _____