

Name:

Date:

Class:

Protein Aggregation Worksheet

Instructions: In this activity, you will make observations about how surfactants affect protein aggregations in egg whites. Based on the data you collect, you will make connections to bioengineering applications of surfactants.

Materials	
• 100 mL egg whites (from carton) • 1 50 mL graduated cylinder • 5 collection tubes with caps • 1 bowl • 1 hand mixer with two beaters • 1 spoon • 2 mL water	• 1 permanent marker • timer (can use phone) • 2 mL mystery solution #1 • 2 mL mystery solution #2 • 2 mL mystery solution #3 • 2 mL mystery solution #4

Control Method:

1. Use the permanent marker to label one of the collection tubes as “control.” This will be for only egg whites.
2. Measure out 20 mL of egg whites and pour it into the bowl.
3. Use the bulb pipette to measure 1 mL water and pipe into the egg whites.
4. Repeat this so there are 2 mL of water added to the egg whites.
5. Set the timer for 2 minutes.
6. On the lowest speed, use the hand mixer to beat the egg whites for 2 minutes.
7. Using the spoon, carefully scrape the foam off the top of the egg whites. Note: Be careful to only scoop off the foam and not the egg whites themselves.
8. Pour the egg whites into the appropriate collection tube.
9. Make observations in the Data Sheet below.
10. Pour the egg whites back into the bowl.
11. Set the timer for 2 minutes.
12. Beat for another 2 minutes on the lowest speed.
13. Again, scrape the foam off of the top and pour into collection tube.
14. Make observations in the Data Sheet below.

Mystery Solution Method:

1. Use the permanent marker to label the rest of the collection tubes as 1, 2, 3, or 4.
2. Measure out 20 mL of egg whites and pour it into the bowl.
3. Use the bulb pipette to measure 2 mL of the first mystery solution you will be testing.
4. Add this to the egg whites in the bowl.
5. Set the timer for 2 minutes.
6. On the lowest speed, use the hand mixer to beat the egg whites for 2 minutes.

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7. Using the spoon, carefully scrape the foam off the top of the egg whites. Note: Be careful to only scoop off the foam and not the egg whites themselves.
8. Pour the egg whites into the appropriate collection tube.
9. Make observations in the Data Sheet below.
10. Pour the egg white mixture back into the bowl.
11. Beat for another 2 minutes on the lowest speed.
15. Again, scrape the foam off of the top and pour into appropriately numbered collection tube.
16. Make observations in the Data Sheet below.
12. Repeat the above steps for the other mystery solutions.

Data Sheet

Control	Observations:
After initial 2 minutes	
After additional 2 minutes	

Mystery Solution 1	Observations:
After initial 2 minutes	
After additional 2 minutes	

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Mystery Solution 2	Observations:
After initial 2 minutes	
After additional 2 minutes	

Mystery Solution 3	Observations:
After initial 2 minutes	
After additional 2 minutes	

Mystery Solution 4	Observations:
After initial 2 minutes	
After additional 2 minutes	

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Reflection Questions

1. Based on your results, which of the solutions would you recommend a bioengineer to investigate further to prevent protein aggregation in medicines? Why?
2. Considering the solution you chose to research further, what *type* of substance do you think it is? Why?