

Name:

Date:

Class:

Sweet Surfactants Student Worksheet

Introduction: In this activity, you will investigate how additives affect surface tension by observing how two liquids interact with a solid surface to coat a treat. Using candy melts and different liquid mixtures, you will explore how changes in composition affect coating quality and surface interactions.

Question: How will additives in the candy melts and the concentration of the corn syrup bath affect how well the treat is coated?

Materials: (for groups of 2-3)

Per person

- 2-3 pre-made cake pops, marshmallows, or fun-sized candy bars (at least 1 per person)
- 1-2 toothpicks or skewers (for holding/dipping treats)
- 1 small plate or wax paper (for drying the treat after dipping)

Per group

- 1 dipping trough/small container
- 100-150 mL water/corn syrup bath
- ~50 g candy melts of varying colors
- 1-2 tsp additives (coconut oil, food-grade lecithin, or vegetable oil)
- 1 drizzle spoon, teaspoon, or a pipette
- 1 scale/balance
- 5-10 food safe weigh boats/paper
- 1 graduated cylinder
- 1 spoon

Procedure:

1. Before beginning, predict what you think will happen when you drop liquid candy melts on the surface of a corn syrup water bath.
2. Record the dipping technique that your group uses (fast or slow) in the data table.
3. Prepare the dipping trough by adding enough of your assigned corn syrup/water bath into your container so that your treat can be fully submerged.
4. Record your assigned corn syrup bath percentage on the data sheet.
5. Using a weigh boat or weigh paper, measure your treat's mass and record that value in the data table.
6. Record the type of candy melt assigned to your group on the data table.
7. Fill your spoon to its maximum level with water and transfer it to a graduated cylinder. Record the volume of liquid that your spoon can hold in the data table.
8. Fill your spoon with candy melt this time.
9. Drizzle your candy melt into your desired pattern on the corn syrup/water bath.

Name:

Date:

Class:

10. As you drizzle, notice how the candy melt interacts with the bath. Does it spread, float, or mix? Are there any interactions where the two liquids meet?
11. Note: Be sure to use all the candy melt in your spoon. Also, be sure to keep your design within the center area of the bath.
12. Once your design covers the surface, take your skewered treat and dip it using the assigned technique.
13. Lift the treat out and allow excess syrup to drip back into the dipping trough.
14. Place the treat on your plate or wax paper to dry.
15. Once dry, record the final mass of your treat.
16. Rate the transfer of your design on your treat.
17. Answer the analysis questions.

Hypothesis

Predict what will happen when you drop liquid candy melts on the surface of a corn syrup water bath.

Data Tables and Observations

Experimental Design

Factor	Low/Slow	High/Fast
Coconut oil/butter concentration	0%	10%
Lecithin concentration	0%	1%
Corn syrup bath concentration	33%	66%
Dipping technique	Slow	Fast

Group Data Table: QuanTitative

Candy Melt Additive Type _____ and %= _____		Candy Melt volume (mL) _____
Corn Syrup Bath % _____		
Mass of Treat BEFORE Dip (g) _____	Mass of Treat AFTER Dip and Dry (g) _____	Mass of Candy Melt Transfer (g) _____

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Name:

Date:

Class:

Group Data: Qualitative (Rank Each from 1=Poor, 5=Excellent)	
Coating Uniformity=Rank _____	Pattern Integrity= Rank _____
Drips/Smears=Circle one: Yes or No	% Coverage of Treat (Visually estimate or use an image to analyze)= _____

Observations: Qualitative Data	
What happens when you squeeze the candy melts onto the corn syrup?	

Analysis Questions	
Why does the candy melt behave the way that you observed when it interacted with the corn syrup?	
List other instances where you have seen a similar interaction between two different materials.	
What forces cause the type of interaction that you witnessed in this activity?	
Transfer your group data to the class data sheet. Which combination of factors resulted in the best candy melt transfer in our experiment?	

Name:

Date:

Class:

Optional EXTENSIONS:

Design a different ratio concentration of corn/syrup bath and technique that you didn't experience in the activity. Try testing other treat surfaces, porous vs. non-porous.

New Group Data Table: QuanTitative

Candy Melt Additive Type _____ and %= _____		Candy Melt volume (mL) _____
Corn Syrup Bath % _____		
Mass of Treat BEFORE Dip (g) _____	Mass of Treat AFTER Dip and Dry (g) _____	Mass of Candy Melt Transfer (g) _____

Group Data: QuaLitative
(Rank each from 1=Poor, 5=Excellent)

Coating Uniformity=Rank _____	Pattern Integrity= Rank _____
Drips/Smears=Circle one: Yes or No	% Coverage of Treat (Visually estimate or use an image to analyze)= _____