

Investigating Contact Angle Worksheet

Introduction

The way water interacts with the surface of an object can have important consequences. In this lab, you will learn more about different surface coatings and their uses.

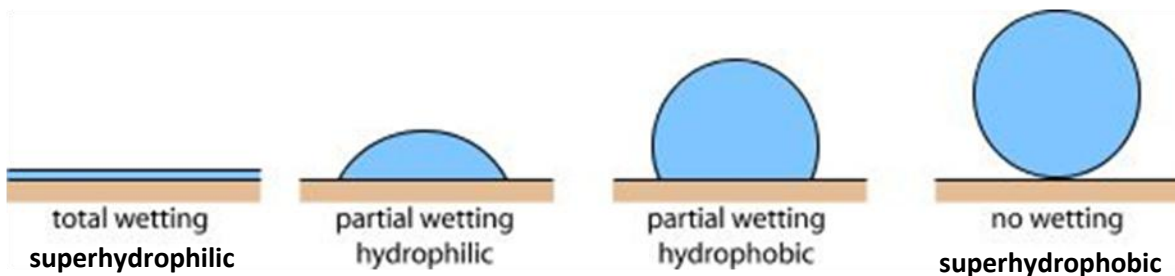
Equipment

- pre-treated microscope slides
- beaker
- pipette
- magnifying glass
- hot plate
- tongs
- lab gloves

A. Observing Surface Coatings

Introduction

Your teacher will provide you with up to five glass microscope slides labeled A-E. One of these slides is plain glass, and the rest have been treated with a variety of glass treatments to change the surface properties. In this part of the lab, you will observe how water acts differently on each of these surfaces. *Wear gloves when handling coated glass.*



Procedure

1. On each glass slide, **place** a drop of water using the pipette. **Look** at the shape the water drops take on the glass slides. In the data table below, **describe** or carefully **sketch** what they look like.
2. Next, **pick up** each slide with a water droplet and tilt them from side to side. How does the water drop behave on each slide?
3. Using your observations from 1-3 and the diagram above, determine if the surface of each glass slide is hydrophilic or hydrophobic.
4. Which slide is the *most* hydrophilic? _____
5. Which slide is the *most* hydrophobic? _____

Slide ↓	Water Drop Shape	Behavior of Drop When Tilted	Type of Surface (hydrophilic or hydrophobic)
A			
B			
C			
D			
E			

B. Increasing Visibility in a Rain Storm

Introduction

If you have ever driven through a heavy downpour, you know rain can make it difficult to see the road or other cars. To improve visibility during a rainstorm, it is best if the windshield is able to shed water as fast as possible. In this part of the lab, you will test the surface coatings from Part A and decide which would be the best product to apply to the outside of a windshield to improve visibility during a rainstorm.

Prediction

In Part A, you observed the effect on water of different surface coatings. Using these observations, would you expect a hydrophobic or hydrophilic surface to shed water fastest? Which glass surface, A-E, do you expect to work best in a rain storm? (Answer on a separate sheet of paper. Use 2-3 sentences. Explain your answers and use evidence from Part A to support your answers.)

Procedure

1. **Fill** a small beaker of water.
2. **Hold** the microscope slide with coating A over a sink at an angle. When ready, **pour** the beaker of water down the side of the slide. **Observe** the water moving on the slide and **record** your observations in the table, below.
3. **Repeat** steps 1-2 for the other coated slides.

Glass Coating ↓	Observations
A	
B	
C	
D	
E	

4. Compare your observations for Part A and for Part B. Do you notice a relationship between a surface coating's behavior in Part A and its behavior in Part B? If yes, state the relationship below.
5. Was your prediction for the best rain coating correct? If not, provide 2-3 reasons the experiment may have come out differently than you had predicted.

C. Anti-Fogging Properties

Introduction

Another important application for glass treatments is to avoid the reduced visibility caused by the condensation forming on glasses, goggles, windshields and other glass and plastic surfaces. In this section, you will predict which glass coating avoids this loss of visibility and perform an experiment to test your prediction.

Prediction

Use your observations from Part A to predict what type of surface coating has better anti-fogging properties, hydrophobic or hydrophilic. Which glass surface, A-E, do you expect to work the best? (Answer on a separate sheet of paper. Use 4-5 sentences. Explain your answers and use evidence from Part A and B to support your answers.)

Procedure

1. **Fill** a beaker with water and **place** it on a hot plate. **Turn** the heat to medium.
2. **Wait** five minutes. The water should be hot, *but not boiling*.
3. *Using the tongs*, **hold** each slide above the beaker for 30 s. Before removing each slide, **note** the following observations: Has water condensed onto the slide? Has visibility been reduced through the glass? (Has it become foggy?) **Record** your observations in the table, below.

Glass Coating ↓	Did Water Condense?	Has Slide Become Foggy?
A		
B		
C		
D		
E		

4. Compare your observations for Part A with your observations for Part C. Do you notice a correlation to the two behaviors? State your correlation below.
5. Was your prediction for the best anti-fogging agent correct? If not, provide 2-3 reasons the experiment may have come out differently than you had predicted.