Name: _____ Date: _____

Naturally Hydrophobic

Investigating Contact Angle

Introduction

Interactions between the surfaces of two objects have important implications. In this lab investigation, you will learn about products which exhibit hydrophobic wetting properties and substantiate claims of contact angle measurements.

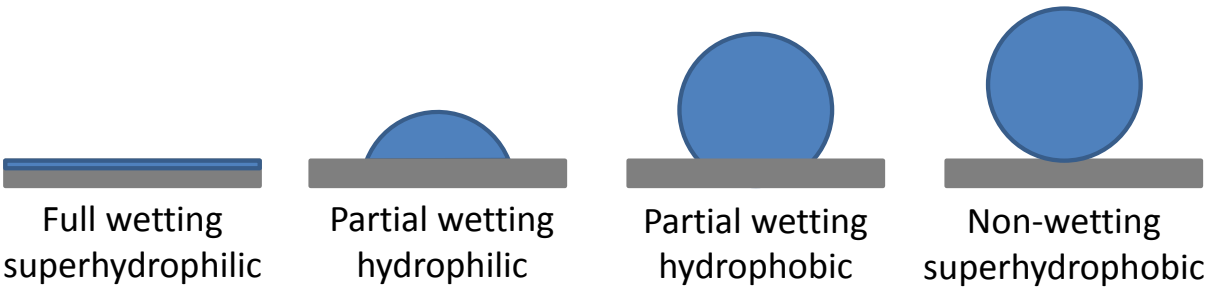
Equipment

- Microscope slides
- aluminum foil
- beaker
- pipette
- tongs
- lab gloves
- camera
- protractor
- Hydrophobic coatings. Your instructor will indicate which coatings to use for Part I, Part II. and Part III.

I. Observing Surface Layers

Introduction

Your group will be provided with five glass microscope slides labeled. The slides will be covered with aluminum foil. One of these slides is your control, and the other slides will be coated with hydrophobic coating to change the surface properties. In this part of the lab, you will observe how water acts differently on each surface. *Wear gloves when handling the coated slides.*



Procedure- Part A

1. Cover the microscope slides with aluminum foil. Label the slides A, B, C, D and E on one side.

2. On the unlabeled side, treat slide B with a hydrophobic coating.

3. Place a drop of water on the untreated aluminum slide using the pipette. Observe the shape the water drop forms on the slide. In the data table below, describe and carefully sketch what you see.

4. Next, place a drop of water on the aluminum slide treated with the hydrophobic coating using the pipette.
5. Observe the shape the water drop forms on the aluminum slide. In the data table below, describe and carefully sketch what you see.

6. . Pick up each slide with a water droplet and tilt it from side to side. How does the water drop behave on each slide?

7. Using your observations from 1-3 and the diagram above, decide if the surface of each glass slide is hydrophilic or hydrophobic.

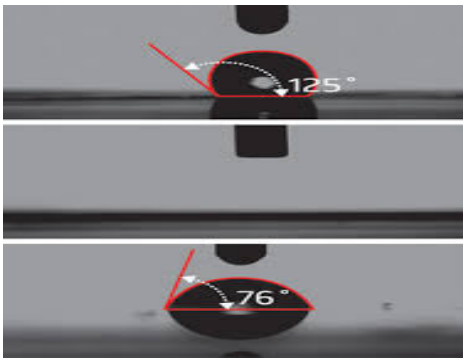
8. Slide A is _____? Which means_____.

9. Slide B is _____? Which means_____.

Slide ↓	Water Drop Shape (Sketch)	Observations	Type of Surface (hydrophilic or hydrophobic) Explain
A			
B			

Procedure- Part B

1. Place a drop of water on the untreated aluminum slide using the pipette.
2. Record 10-20 seconds of live video of the water drop.
3. Adjust lighting and focus to ensure the highest quality image.
4. Adjust the camera viewing angle to 0 degrees. See diagram below.



5. Measure the contact angle of the water droplet. Record your measurement in the data table below.
6. Repeat steps 1-5 for the coated aluminum slides. Record all measurements in the data table below.
7. Does the maunfacturer meet its claim of a hydrophobic coating (contact angle greater than 90 degrees?)?

II. Increasing Your Car's Appeal

Introduction

If you have ever washed your car only to see splashes of mud and debris hours later? To improve longevity of your car wash (and your paint lifetime), it is best if the cars paint is able to shed water and dirt as fast as possible. In this part of the lab, you will test the hydrophobic coating from Part A as well other commercially available products and decide which would be the best product to apply to the body of a car to improve paint lifetime and decrease car washings.

(You may substitute aluminum slides with small model cars if available.)

Prediction

In Part A, you observed the effect on water of a hydrophobic surface coating. Using these observations, would you expect a hydrophobic or hydrophilic surface to shed water fastest? After researching the products available, which product do you expect to produce the best results (i.e. self-clean the best.) Thoroughly explain your answers and use evidence from Part A to support your answers.

Procedure

1. Hold the aluminum slide A (control sample) over the beaker at an angle. When ready, slowly increase the angle of the slide until the water drop begins to slide. Observe the water moving on the slide and record your observations in the table, below. (You may also record live video of the water drop)
2. Repeat step one for coating B.
3. Using three of the available products, create new slides C, D and E for testing.
4. Repeat steps 1-2 for all of the coated slides.

Coating ↓	Observations
A (Control)	
B	
C	
D	
E	

5. Compare your observations all of the surface coatings. Which coating provides the best self-cleaning properties? Support your answer with data.

6. Was your prediction for the best protective coating correct? If not, provide 2-3 reasons the experiment may have come out differently than you predicted.

II. Extension

Do you think the advertised product works the same on wood, vinyl, leather, concrete, asphalt, and/or canvas? Repeat the experiment using other samples. Remember to keep a control. Write a thorough review on each sample tested based on your findings. Be prepared to present your reviews and substantiate your conclusions.