

# Contact Angle

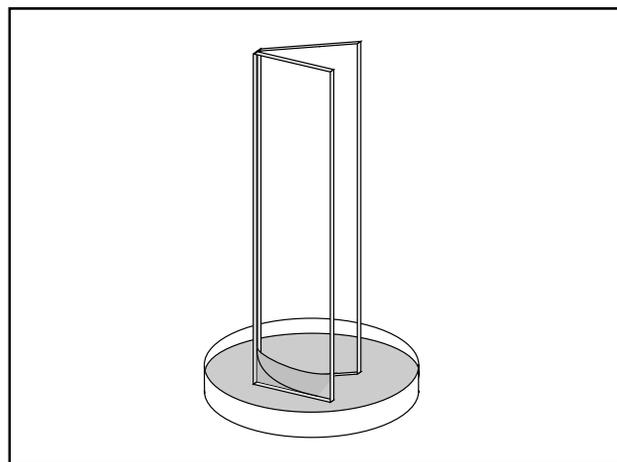
## OBJECTIVE:

To measure the contact angle of a fluid.

## BACKGROUND:

In the absence of the stabilizing effect of gravity, fluids partly filling a container in space are acted on primarily by surface forces and can behave in striking, unfamiliar ways. Scientists must understand this behavior to manage fluids in space effectively.

Liquids always meet clean, smooth, solid surfaces in a definite angle, called the contact angle. This angle can be measured by observing the attraction of fluid into sharp corners by surface forces. Even in Earth's gravity, the measurement technique can be observed. If a corner is vertical and sharp enough, surface forces win out over the downward pull of gravity, and the fluid moves upward into the corner. If the angle between the two glass planes is slowly decreased, the fluid the glass is standing in jumps up suddenly when the critical value of the corner angle is reached. In the absence of gravity's effects, the jump would be very striking, with a large amount of fluid pulled into the corner.



## PROCEDURE:

- Step 1.** Place a small amount of distilled water in a dish. (Note: It is important that the dish and the slides are clean.)
- Step 2.** Place two clean microscope slides into the water so that their ends touch the bottom of the dish and the long slides touch each other at an angle of at least 30 degrees. (Optional step: You may find it easier to manipulate the slides if a tape hinge is used to hold the slides together.)
- Step 3.** Slowly close the angle between the two slides.
- Step 4.** Stop closing the angle when the water rises between the slides. Use the protractor to measure the contact angle (angle the water rises up between the slides). Also measure the angle between the two slides.

### MATERIALS NEEDED:

Distilled water  
Microscope slides  
Shallow dish  
Protractor  
Cellophane tape

### FOR FURTHER RESEARCH:

1. Add some food coloring to the water to make it easier to see. Does the addition of coloring change the contact angle?
2. Measure the contact angle for other liquids. Add a drop of liquid soap or alcohol to the water to see if it alters water's contact angle.
3. Try opening the wedge of the two slides after the water has risen. Does the water come back down easily to its original position?

### QUESTIONS:

1. What is the mathematical relationship between the contact angle and the angle between the two slides?

$$\text{Contact angle} = 90 - 1/2 \text{ wedge angle}$$

2. Why is it important to understand the behavior of fluids in microgravity?

