

## Cycle 2 Chemistry I Lesson 1

### Observe & Explain Surface Tension in Liquids

LAB WEDNESDAY! DRESS ACCORDINGLY!

#### Agenda:

Vocab: Cohesion, Adhesion, Surface Tension

Problems p.384 #1, #2

Demo: How many drops of water can fit on a penny?



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### States of Matter

- Most substances can be in three states: solid, liquid, and gas.

### Solid Particles Have Fixed Positions

- The particles in a solid are very close together and have an orderly, fixed arrangement.
- Solid particles can vibrate only in place and do not break away from their fixed positions.
- Solids have fixed volumes and shapes.



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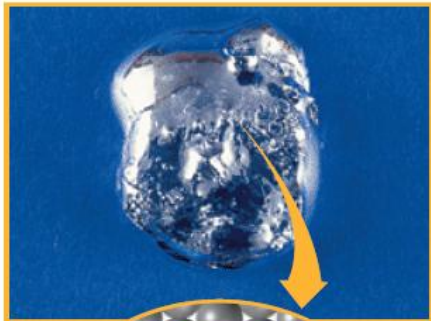
Resources



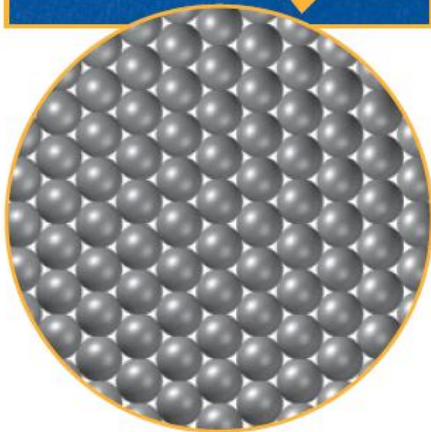


### Mercury in Three States

Solid Hg



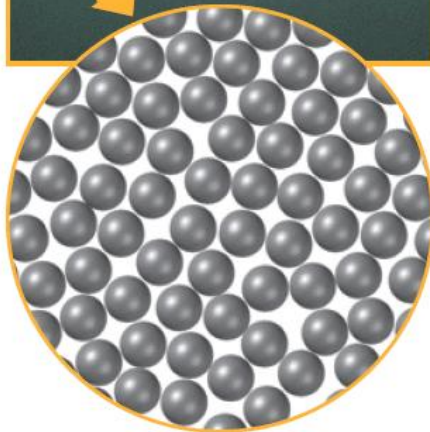
Rich Treptow/Visuals Unlimited



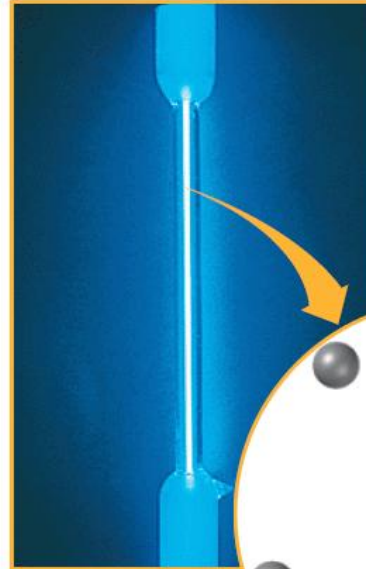
Liquid Hg



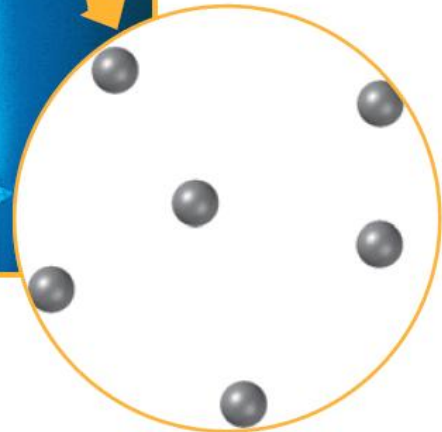
Russ Lippa/Photo Researchers, Inc.



Gaseous Hg



Charlie Waters/Photo Researchers, Inc.





### States of Matter, *continued*

#### Liquid Particles Can Move Easily Past One Another

- The particles in a liquid are very close together and have a random arrangement.
- Liquid particles have enough energy to be able to move past each other readily, which allows liquids to flow.
- Liquids have fixed volumes but can flow to take the shape of the lower part of a container.



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### States of Matter, *continued*

### Liquid Forces Lead to Surface Wetting and Capillary Action

- Liquid particles can have *cohesion*, attraction for each other.
- Liquid particles can also have *adhesion*, attraction for particles of solid surfaces.
- The balance of cohesion and adhesion determines whether a liquid will wet a solid surface.
- The forces of adhesion and cohesion will pull water up a narrow glass tube, called a capillary tube.

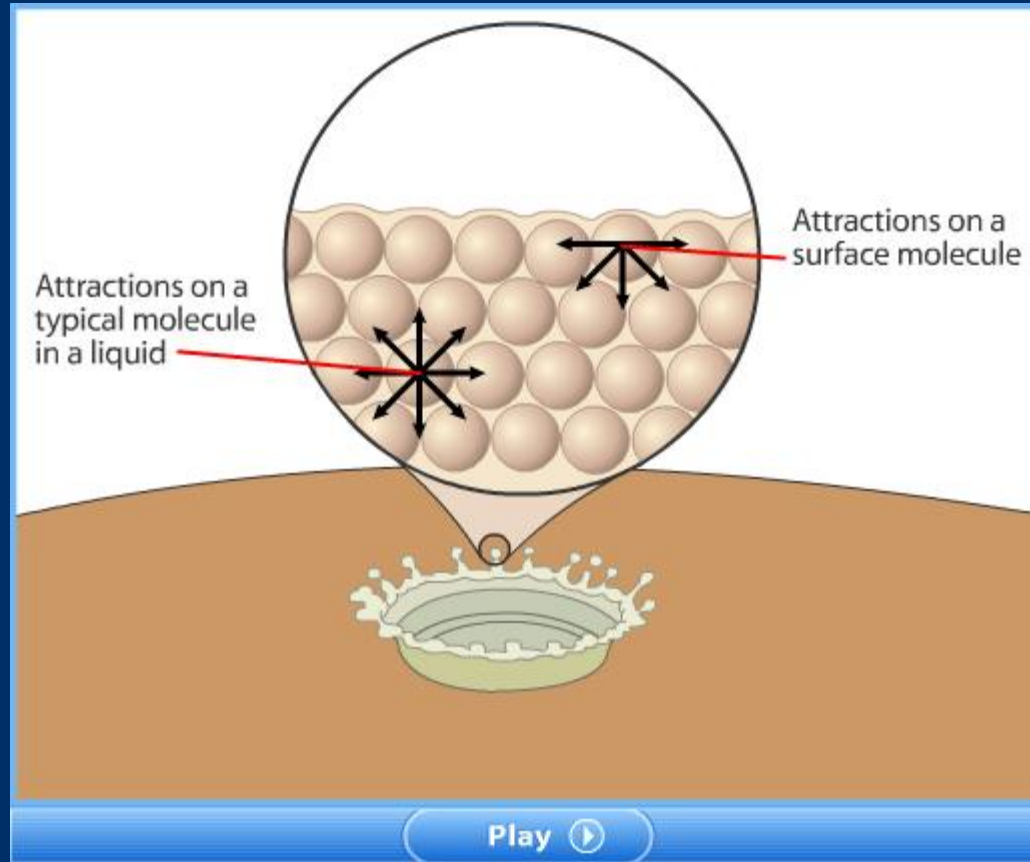


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### Comparing Cohesion and Adhesion



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### States of Matter, *continued* Liquids Have Surface Tension

- Below the surface of a liquid, the particles are pulled equally in all directions by cohesive forces.
- However, surface particles are pulled only sideways and downward, so they have a net downward force.
- It takes energy to oppose this net force and increase the surface area.
- The tendency of liquids to decrease surface area to the smallest size possible is **surface tension**.



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### Surface Tension

Attractions on a typical molecule in a liquid

Attractions on a surface molecule

Play ▶

End of Slide

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### States of Matter, *continued*

#### Gas Particles Are Essentially Independent

- The particles in a gas are very far apart and have a random arrangement.
- The attractive forces between particles in a gas do not have a great effect, so the particles move almost independently of one another.
- The shape, volume, and density of an amount of gas change depending on the size and shape of the container.



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## Surface Tension in Action!

How many drops of water can fit on top of a penny? Try it!

How many drops of SOAPY water can fit on top of a penny?

What does soap do to surface tension?



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