Warm-Up | Liquids

The Postulates of Kinetic Theory

- All [ ] is composed of small particles.
- These particles are in constant random motion.
- [ ] between particles are perfectly elastic.
- The particles obey [ ] laws of motion:

I. The motion of an object changes only if it is acted on by an unbalanced force.

II. The relationship between the mass (m), acceleration (a), and applied force (F) of an object is $F = ma$.

III. For every action, there is an equal and opposite reaction.

Lesson Objectives

By the end of this lesson, you should be able to:

- Describe how the postulates of [ ] theory apply to liquids.
- Describe how kinetic-molecular theory explains the properties of liquids, including [ ] and shape.

Science Practice: Use the kinetic-molecular theory model to explain the behavior of liquids.

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Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

	the thickness or resistance to flow of a liquid
	a compound that reduces the repulsion (tension) between two liquids, or a liquid and a solid, or a liquid and air
	to integrate a solid, liquid, or gas into a host liquid (solvent)
	the property of the surface of a liquid that allows it to resist an external force
	referring to two liquids separating when mixed
	referring to a solid, liquid, or gas becoming integrated into a host liquid (solvent)

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Lesson Question

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Particles in Liquids

- Kinetic energy comparable with [ ] attractions
  - Denser than [ ]
  - Fixed [ ] (not compressible)
- Particles not fixed in place
  - Able to flow
  - Take shape of container

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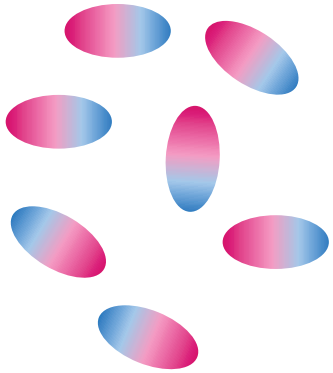
Intermolecular Forces and Condensation

Intermolecular forces

- Affect interactions between [ ]
- Stronger forces → more [ ] to overcome
- Condensation: [ ]
  energy < intermolecular forces
- [ ]/boiling: kinetic energy > intermolecular forces



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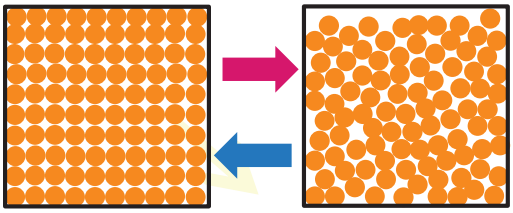
Intermolecular Forces and Freezing

- Liquid particles: _____, random motion
- _____ particles: fixed in place, vibrate
- Freezing: kinetic energy < intermolecular forces
- _____: kinetic energy > intermolecular forces



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Viscosity

Viscosity: the thickness or _____ to flow of a liquid

- Inversely correlated to _____
- Directly correlated to size (_____) of particles
- Directly correlated to _____ of intermolecular forces

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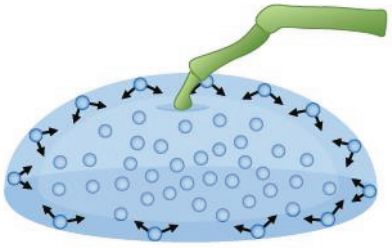
Surface Tension

Surface tension: the tendency for a liquid surface to _____ penetration

- Directly correlated to intermolecular _____
- _____ can reduce surface tension



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Compressibility

Liquids are incompressible.

- Application: [ ]
  - Liquid used to transmit force
- Examples
  - Car [ ]
  - Airplane flaps
  - Construction equipment
  - Robotics

Dissolving

Liquids can **dissolve** solids, other liquids, and gases.

- **Dissolve**: when a solid, liquid, or gas becomes integrated into a host liquid ([ ])
- Particles become evenly dispersed among liquid particles
- [ ] liquids: dissolve in each other

Dissolving

[ ] liquids: cannot dissolve in each other

- Particles remain separate

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Summary | Liquids

Lesson Question

How do scientists describe the behavior of particles in liquids?

Answer

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Particles in Liquids

- Particles in liquids move apart from each other just enough to lose the geometric shape of the solid, but not far enough to become a [ ]; liquids are in the middle.
- Liquid particles have the ability to flow; they are in contact with each other but can slide past one another.
- When liquid particles gain enough kinetic energy to overcome their intermolecular attractions, the liquid becomes a gas. This is called evaporation/[ ].
- When liquid particles lose energy so that the intermolecular forces become strong enough to hold the particles in fixed positions, the liquid becomes a solid.

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Summary | Liquids

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Properties of Liquids

- Many of the properties of liquids depend on intermolecular forces.
- As intermolecular forces become stronger, boiling points increase.
- [ ], or resistance to flow, depends on intermolecular forces as well as temperature and particle size.
- Surface tension depends primarily on intermolecular forces; [ ], which disrupt these forces, can decrease surface tension.
- Because liquid particles are in constant contact, liquids are incompressible.
- Because liquid particles are not fixed in place, liquids can dissolve other substances.

Use this space to write any questions or thoughts about this lesson.

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