

Warm-Up | Phase Changes



Lesson Objectives

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

- Describe phase changes in terms of **kinetic**-molecular theory.
- Describe the energy changes that happen during changes of **state**.

Science Practice: Make and interpret graphs of temperature vs. **time** for changes of state.



Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

- | | |
|-------------------------|---|
| <u>B</u> condensing | A. a transition from liquid phase to vapor phase |
| <u>C</u> deposition | B. a transition from vapor phase to liquid phase |
| <u>A</u> boiling | C. a transition directly from vapor phase to solid phase |
| <u>E</u> melting | D. a transition from liquid phase to solid phase |
| <u>G</u> vapor pressure | E. a transition from solid phase to liquid phase |
| <u>D</u> freezing | F. a transition directly from solid phase to vapor phase |
| <u>F</u> sublimation | G. the pressure exerted by the gas in equilibrium with a pure liquid at a given temperature |

Instruction

Phase Changes

Slide

1

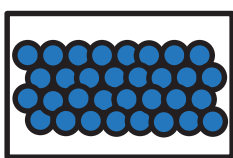
Lesson Question

What happens when matter changes its form?

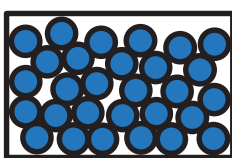
2

States of Matter

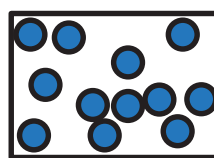
The state of matter depends on the motion of particles.



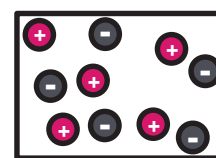
Solid



Liquid



Gas



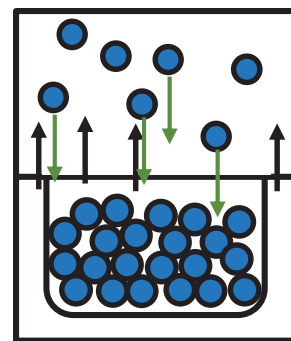
Plasma

Equilibrium between Liquid and Gas

- **Particles** move between liquid and gas phase.
- Gas particles exert **pressure**.

Vapor pressure: the pressure exerted by the gas in equilibrium with a pure liquid at a given temperature

- Related directly to **temperature**



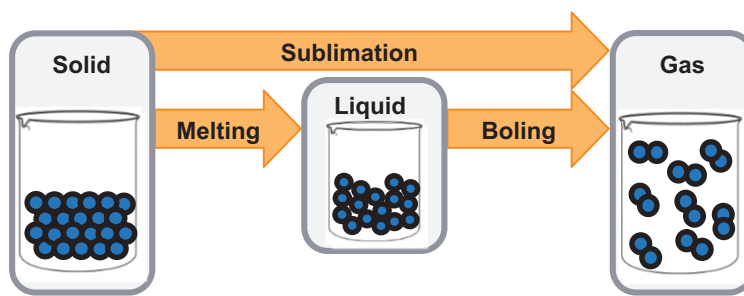
The higher the vapor pressure, the more readily the liquid evaporates.

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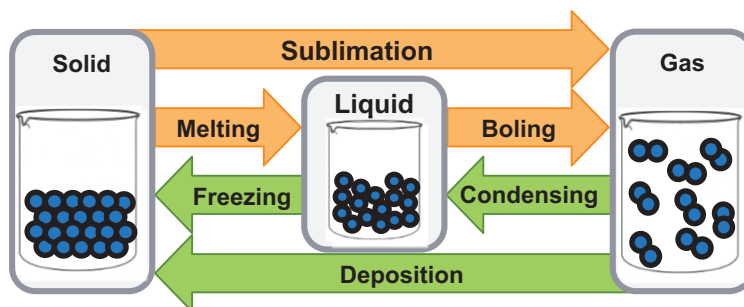
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Phase Transitions

- **Melting** is the transition from solid phase to liquid phase.
- **Boiling** is the transition from liquid phase to vapor phase.
- **Sublimation** is the transition directly from solid phase to vapor phase.



- **Freezing** is the transition from liquid phase to solid phase.
- **Condensing** is the transition from vapor phase to liquid phase.
- **Deposition** is the transition directly from vapor phase to solid phase.



Instruction | Phase Changes

Slide

4

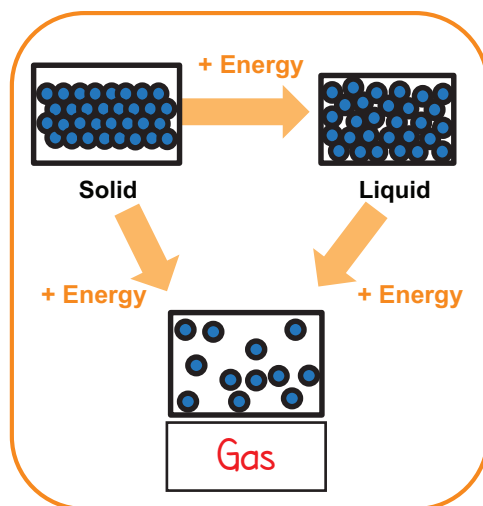
Energy and Phase Changes

Substances **absorb** energy when they:

- melt
- boil
- sublime

Substances **release** energy when they:

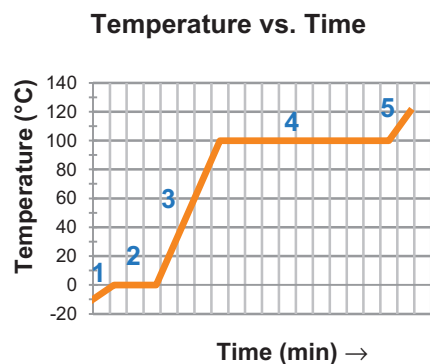
- condense
- freeze
- deposit



6

Temperature and Phase Changes

1. The temperature of solid **increases**.
2. The solid melts.
3. The temperature of the liquid increases.
4. The liquid **boils**.
5. The temperature of the **gas** increases.



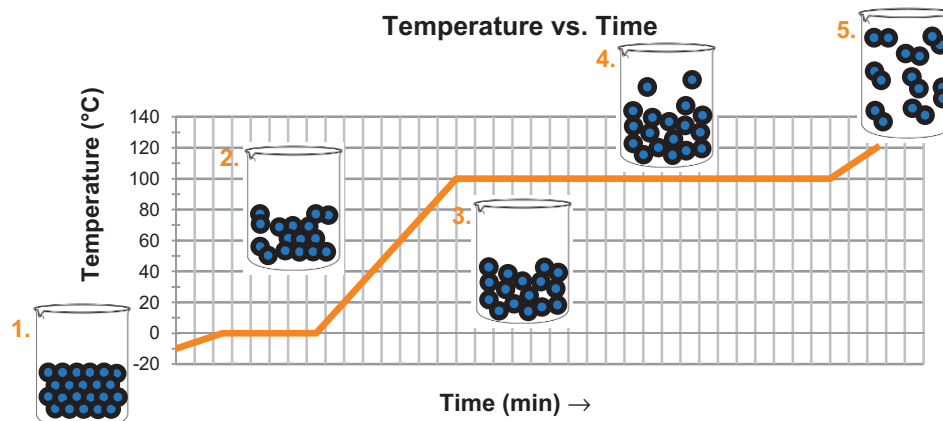
Temperature is constant during phase changes.

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Slide

6

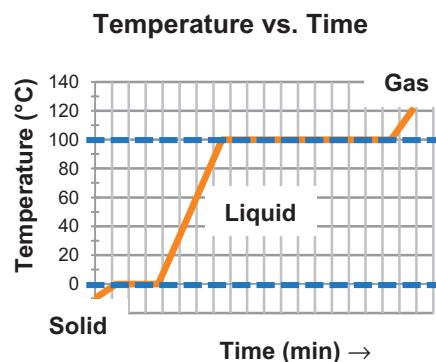
Molecular Level Changes as Heat Is Added



At the **melting** point, the particles in the solid phase begin to enter the **liquid** phase. As the liquid is heated, the particles move faster and faster, entering the **gas** phase.

Interpreting a Temperature Diagram

- The **temperature** increases when there is only solid, liquid, or gas.
- Phase transitions happen at specific temperatures.
- The melting point or **freezing** point is the y-value of the lower horizontal line.
- The **boiling** point is the y-value of the upper horizontal line.



Summary | Phase Changes

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Lesson Question

What happens when matter changes its form?

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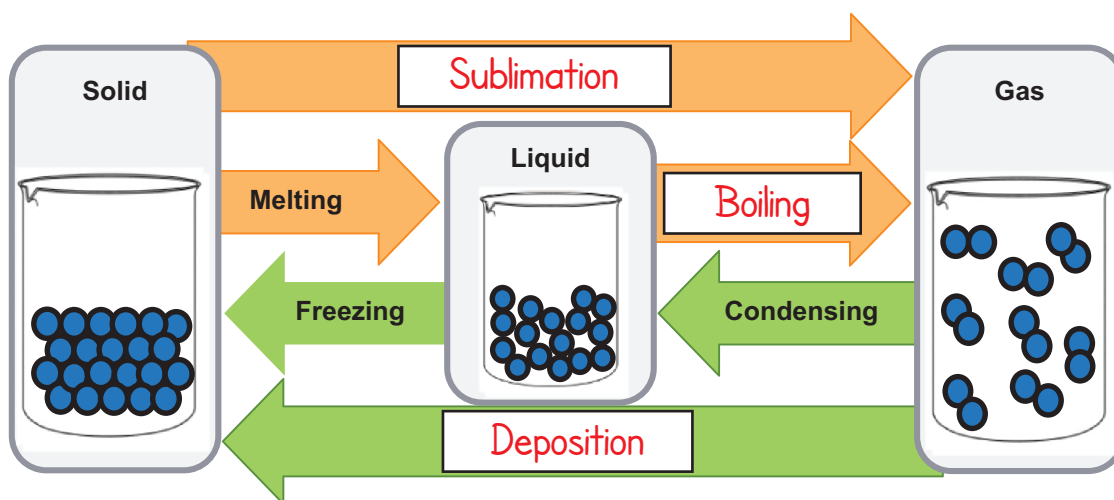
Answer

(Sample answer) States of matter will change form depending on the motion of particles. As the temperature of matter in a particular state increases or decreases, the state of matter will change. There are three types of states, which are liquid, solid, and gas.

Slide

2

Molecular Motion and Phase Changes



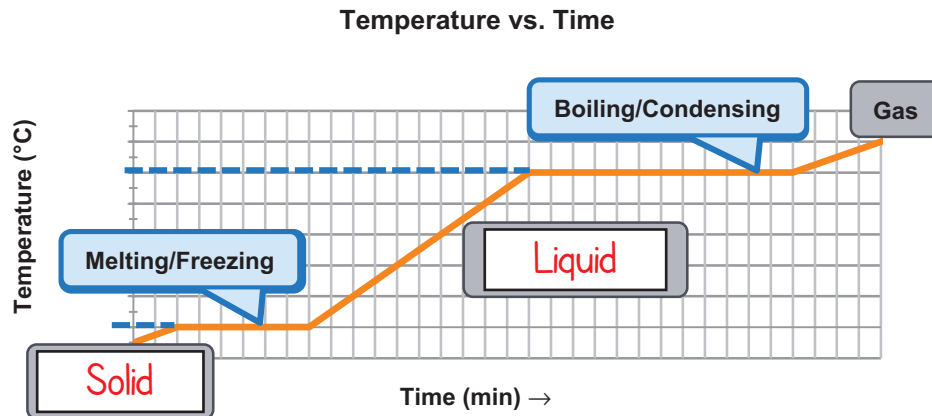
Summary

Phase Changes

Slide

2

Diagramming Phase Changes



The **temperature** increases when the substance is a solid, liquid, or gas.

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