Section 2: Changes of State

Preview

Key Ideas

- What happens when a substance changes from one state of matter to another?

- What happens to mass and energy during physical and chemical changes?

Bellringer

1. What happens to water molecules when water boils?

2. Melting snow is a change of state from a solid to a what?

3. What is the reverse process of melting?

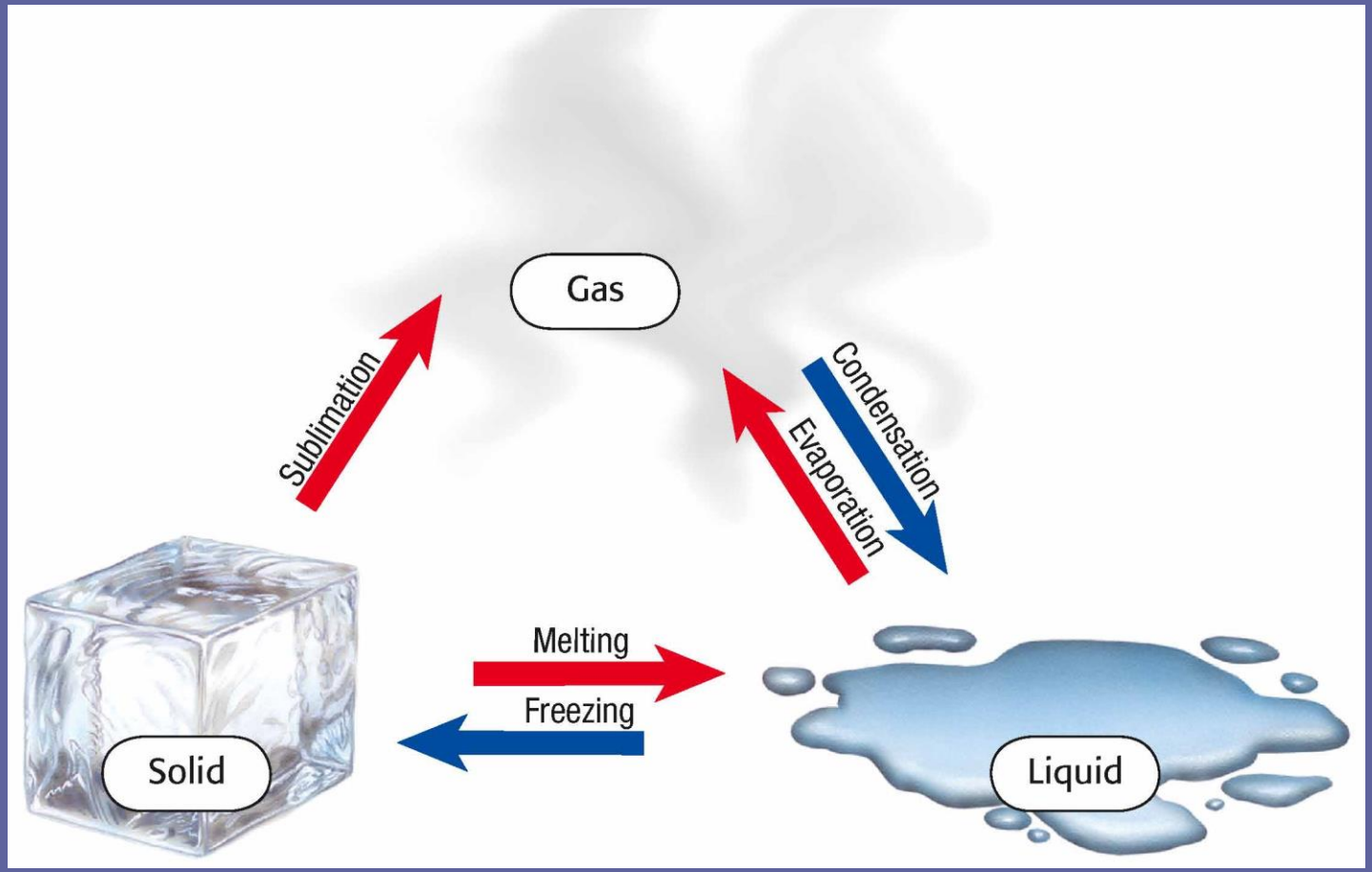
4. Compare the properties of ice, liquid water, and water vapor.

Energy and Changes of State

- What happens when a substance changes from one state of matter to another?

- The identity of a substance does not change during a change of state, but the energy of a substance does change.

Changes of State



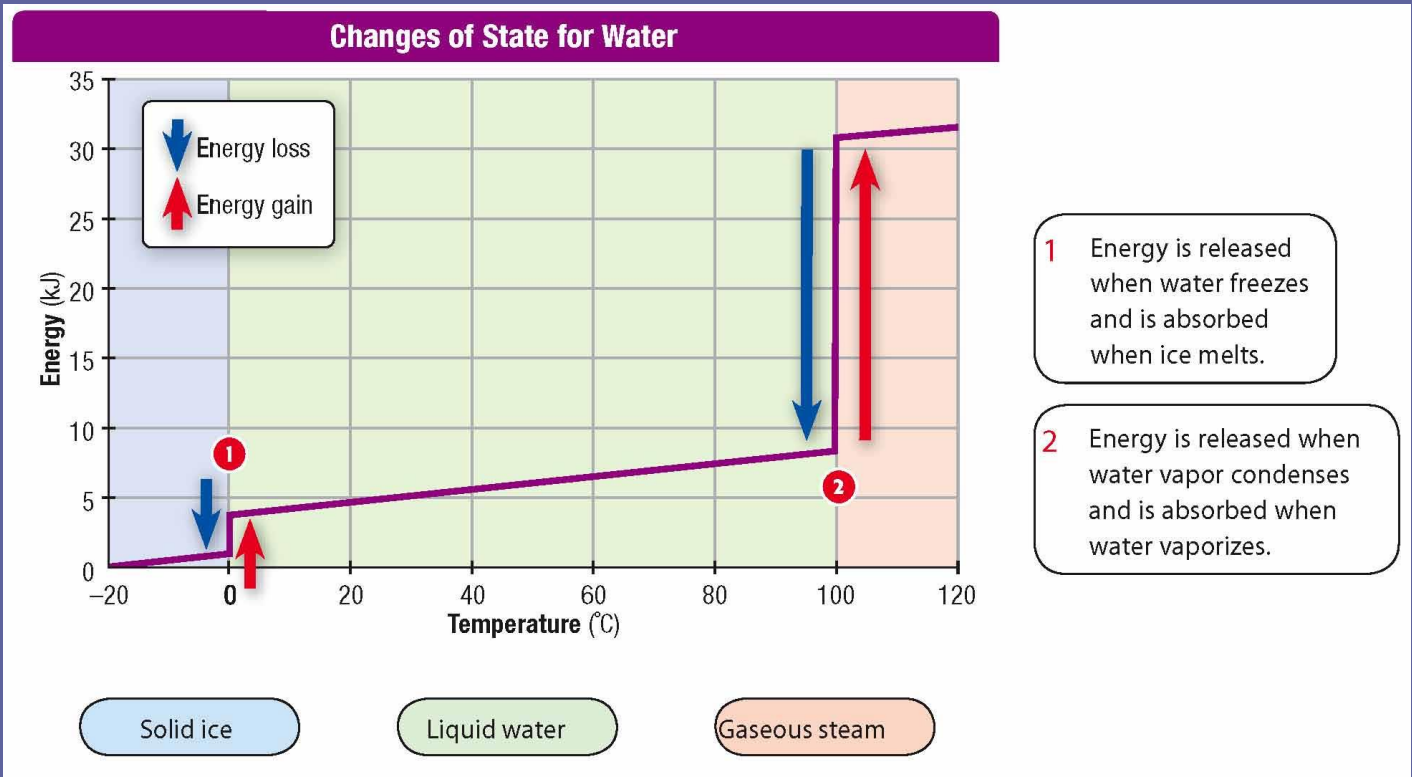
Energy and Changes of State, *continued*

- Some changes of state require energy.
- Changes of state that require energy are melting, evaporation, and sublimation.
  - **evaporation:** the change of state from a liquid to a gas
  - **sublimation:** the process in which a solid changes directly into a gas

Energy and Changes of State, *continued*

- Energy is released in some changes of state.
- Changes of state that release energy are freezing and condensation.
  - **condensation:** the change of state from a gas to a liquid

Changes of State for Water



Conservation of Mass and Energy

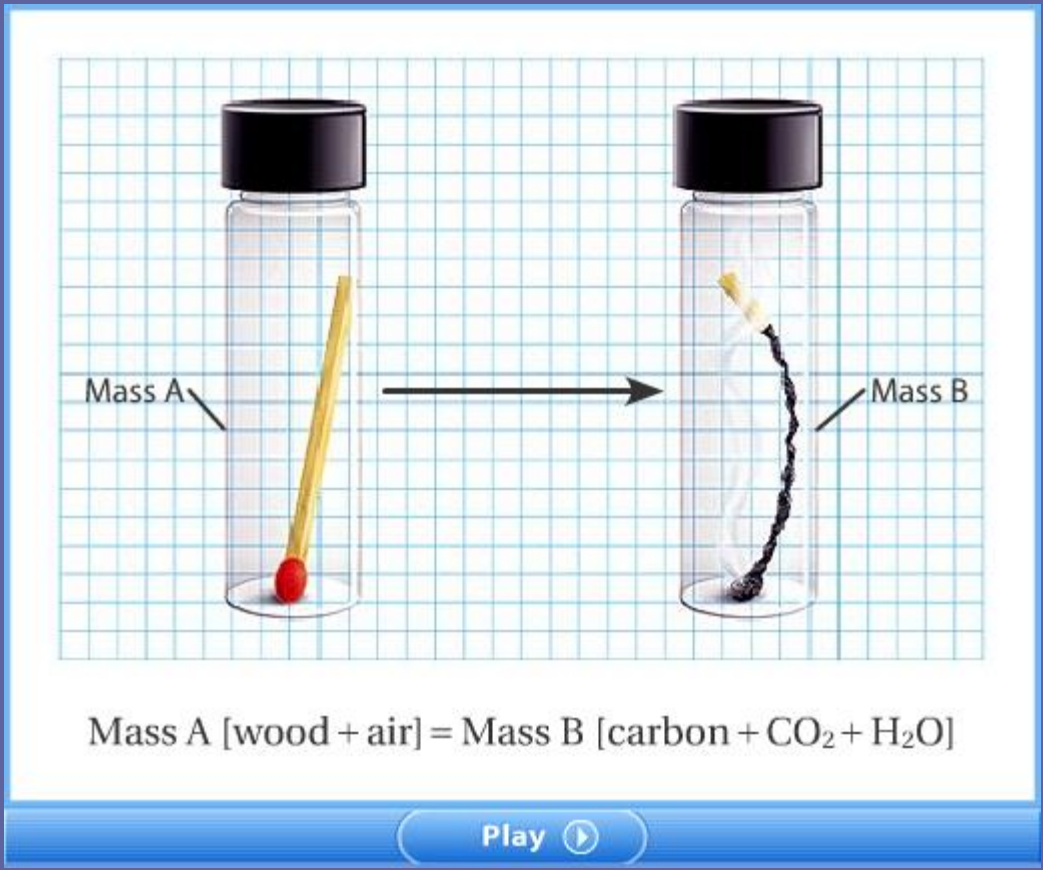
- What happens to mass and energy during physical and chemical changes?

- Mass and energy are both conserved. Neither mass nor energy can be created or destroyed.

Conservation of Mass and Energy, *continued*

- Mass cannot be created or destroyed.
  - In chemical changes, as well as in physical changes, the total mass of the substances undergoing the change stays the same before and after the change.
  - This is the *law of conservation of mass*.

Visual Concept: Law of Conservation of Mass



Conservation of Mass and Energy, *continued*

- Energy cannot be created or destroyed.
  - Energy may be changed to another form during a physical or chemical change, but the total amount of energy present before and after the change is the same.
  - This is the *law of conservation of energy*.

Visual Concept: Law of Conservation of Energy