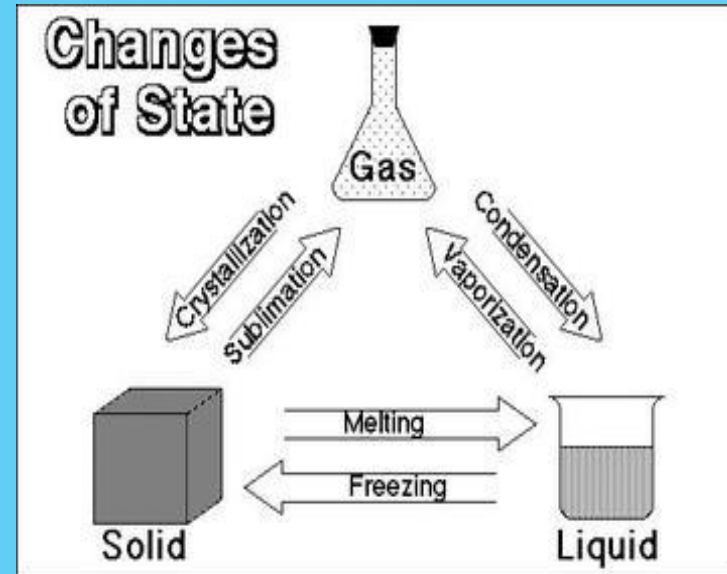


# Changes of State

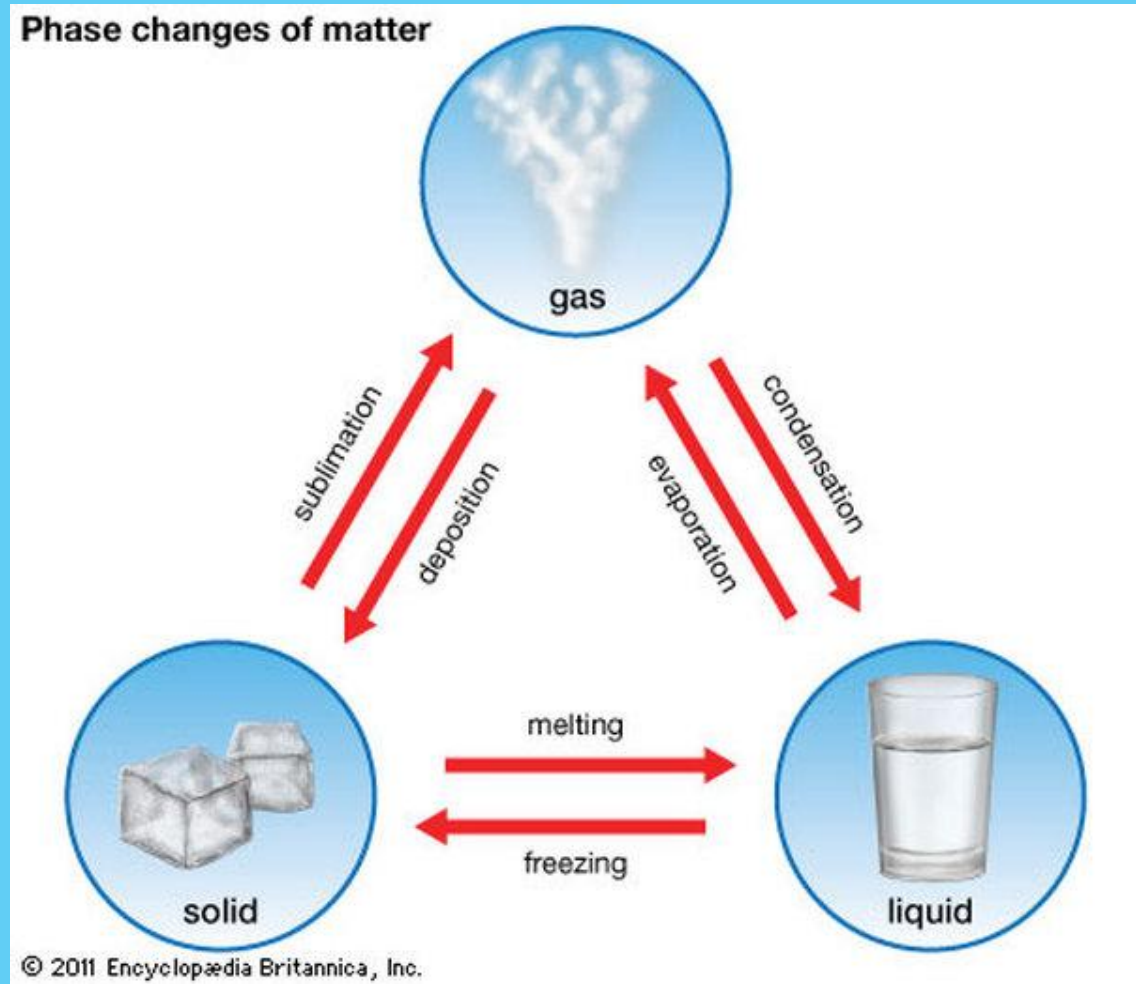
## Objectives

- **Describe** how energy is involved in changes of state.
- **Describe** what happens during melting and freezing.
- **Compare** evaporation and condensation.
- **Explain** what happens during sublimation.
- **Identify** the two changes that can happen when a substance loses or gains energy.



# I. Energy and Changes of State

**A. From Solid to Liquid to Gas** A change of state is the change of a substance from one physical form to another. All changes of state are physical changes. The particles have different amounts of energy when the substance is in different states.



## II. Melting: Solid to Liquid

### A. What Is Melting?

Melting is the change of state from a solid to a liquid.



### B. Adding Energy: When a solid is at its melting point, any energy added to it is used to overcome the attractions that hold the particles in place.



# III. Freezing: Liquid to Solid

**A. What Is Freezing?** The change of state from a liquid to a solid is called freezing.

**B. Removing Energy:** Removing energy will cause the particles in a liquid to begin locking into place.



# IV. Evaporation: Liquid to Gas

- A. Boiling and Evaporation:** Evaporation is the change of a substance from a liquid to a gas. Boiling is the change of a liquid to a vapor, or gas, throughout the liquid.
- B. Effects of Pressure on Boiling Point:** Earlier, you learned that water boils at  $100^{\circ}\text{C}$ . In fact, water boils at  $100^{\circ}\text{C}$  only at sea level, because of atmospheric pressure. Atmospheric pressure is caused by the weight of the gases that make up the atmosphere.



# V. Condensation: Gas to Liquid

**A. What Is Condensation?** Condensation is the change of state from a gas to a liquid.



## VI. Sublimation: Solid to Gas

**A. What Is Sublimation?** Sublimation is the change of state in which a solid changes directly into a gas.

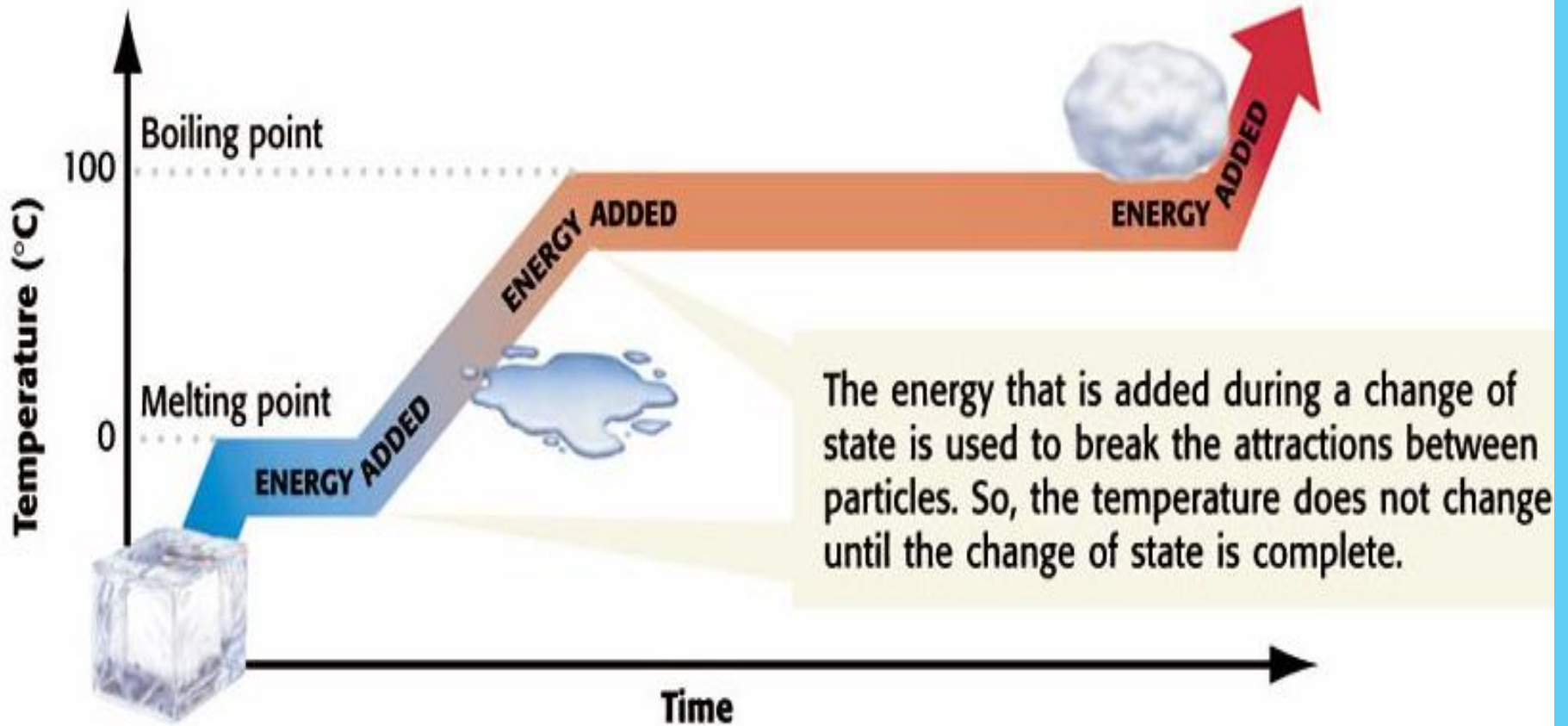


# VII. Change of Temperature vs. Change of State

**A. Losing or Gaining Energy** When most substances lose or gain energy, one of two things happens to the substance: its temperature changes or its state changes. The temperature of a substance is related to the speed of the substance's particles. So, when the temperature of a substance changes, the speed of the particles also changes. But the temperature of a substance does not change until the change of state is complete.



# Changing the State of Water



# Word Bank

- Changes of state
- Melting
- Vaporization
- Liquid
- Condensation
- States of matter
- Solid

