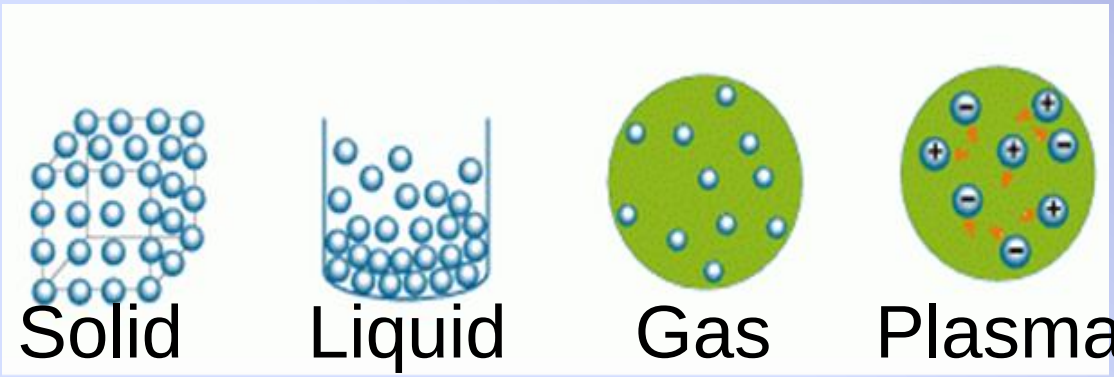
Matter-Properties and Change

S8P1c. Describe the movement of particles in solids, liquids, gases, and plasmas states.

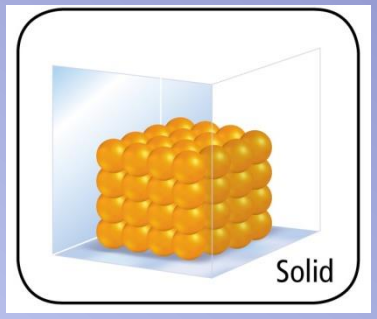
Matter

- Matter is anything that has mass and takes up space.
- Matter is everything around us.

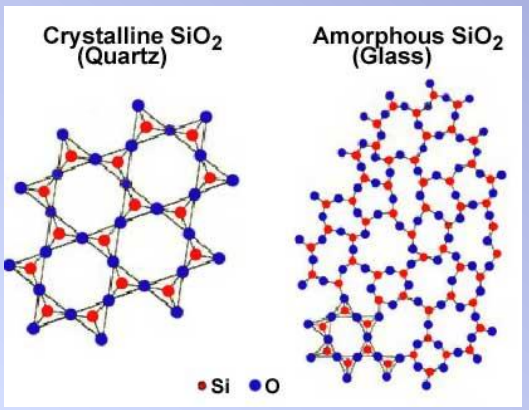


- The physical forms of matter, either solid, liquid, gas, or plasma are called the **states of matter**.

States of Matter

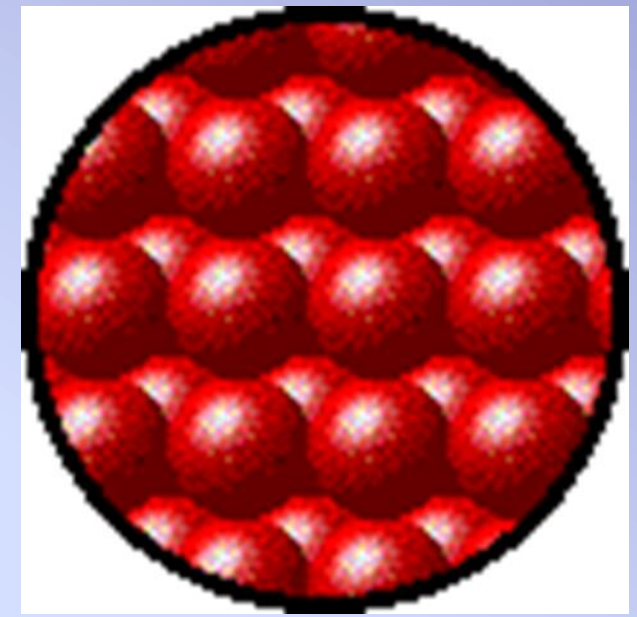


- **Solids** are a form of matter that have their own definite shape and volume.
  - Crystalline
    - Regular repeating pattern
  - Amorphous
    - Does not have the regular pattern of a crystalline structure



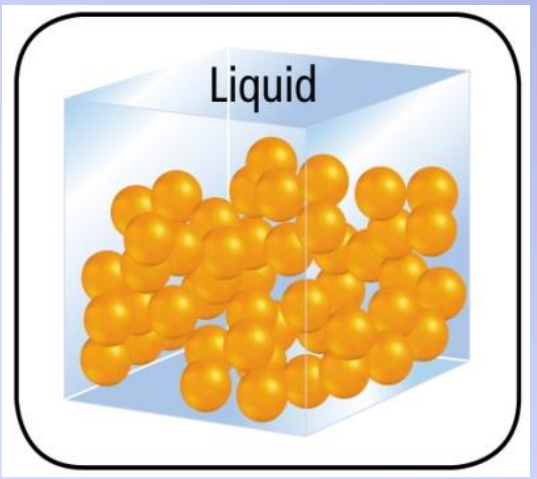
Molecular Motion: Particles in Solids

- Are packed tightly together
- Have very little energy
- ***Vibrate*** in place



States of Matter

- **Liquids** are a form of matter that have a definite volume but take the shape of the container.

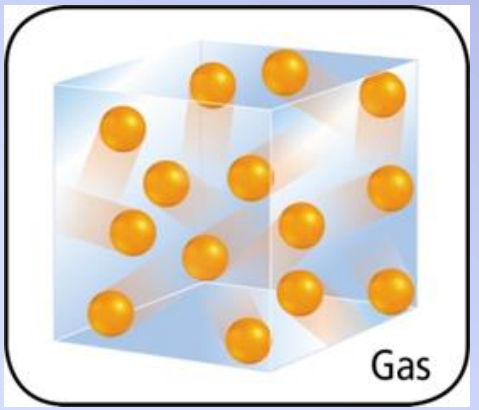


Molecular Motion: Particles in Liquids

- Are loosely packed
- Have medium energy levels
- Particles *flow around each other*

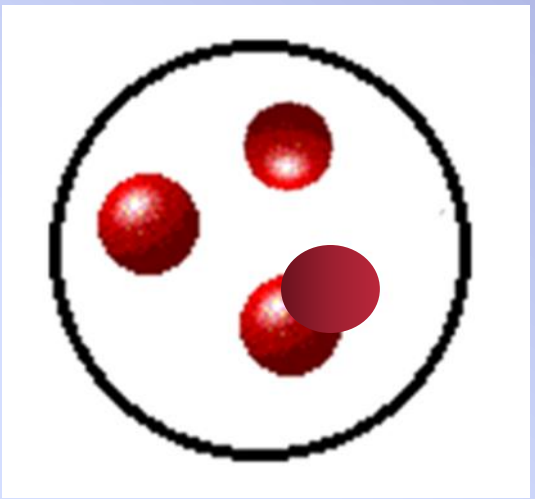
States of Matter

- **Gases** have no definite shape or volume. They expand to fill their container.
  - Vapor refers to the gaseous state of a substance that is a solid or liquid at room temperature.



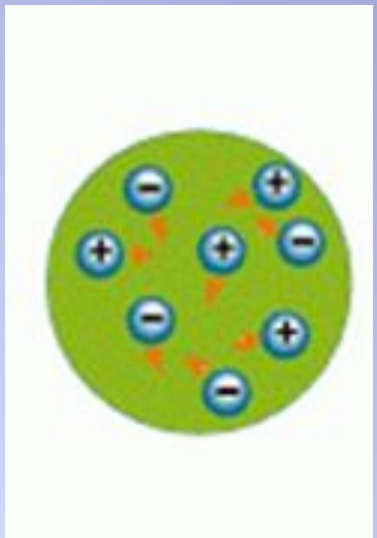
Molecular Motion: Particles in Gases

- Have LOTS of energy
- *Move freely*



States of Matter (cont.)

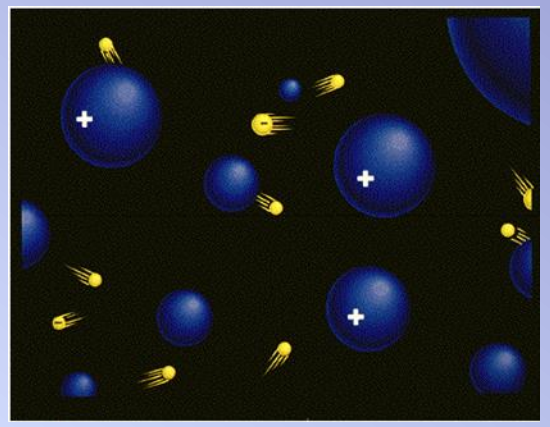
- **Plasma** have no definite shape or volume.
- Lightning is a plasma.
- Used in fluorescent light bulbs and Neon lights.
- Plasma is a lot like a gas, but the particles are electrically charged.



Molecular Motion: Particles in Plasma

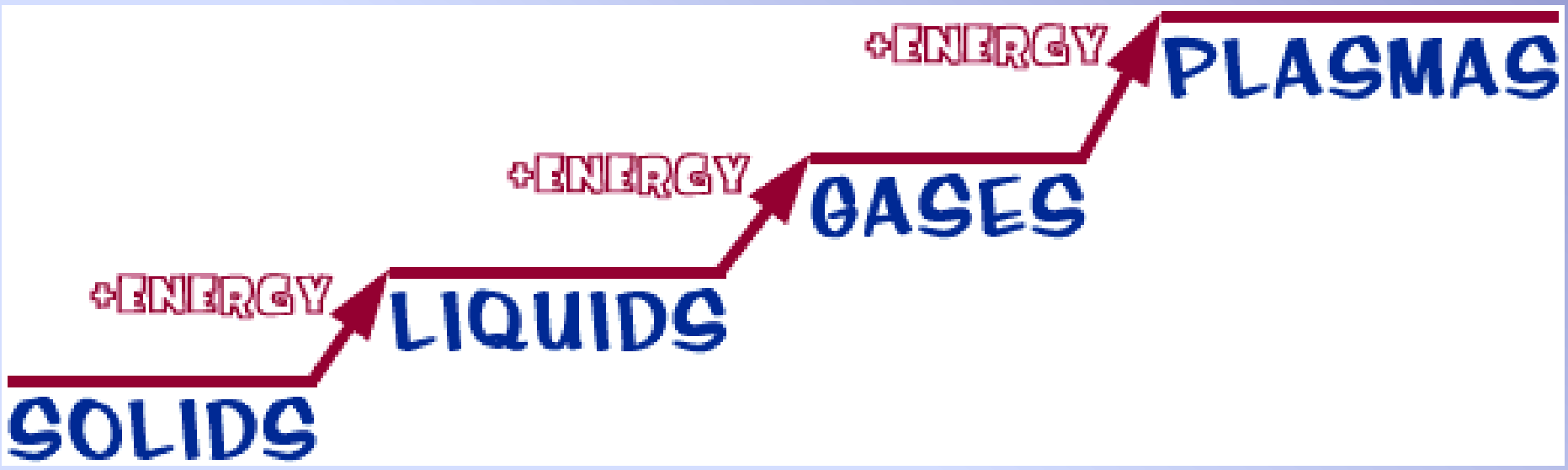
- Have *EXTREMELY high energy levels*

- When temperatures get REALLY hot, electrons can escape from their orbit around the atom's nucleus. This leaves *free-moving negatively charged particles and positively charged ions*



Free-moving protons and electrons

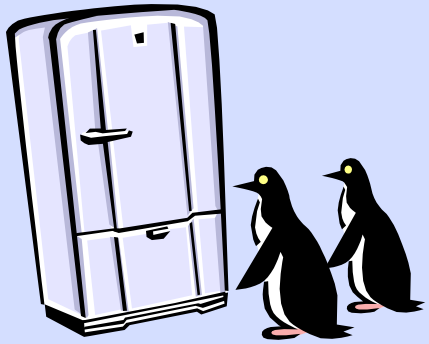
The Amount of Energy determines the State!



Add or Subtract Energy. . .

When energy is added, particles in matter move faster!

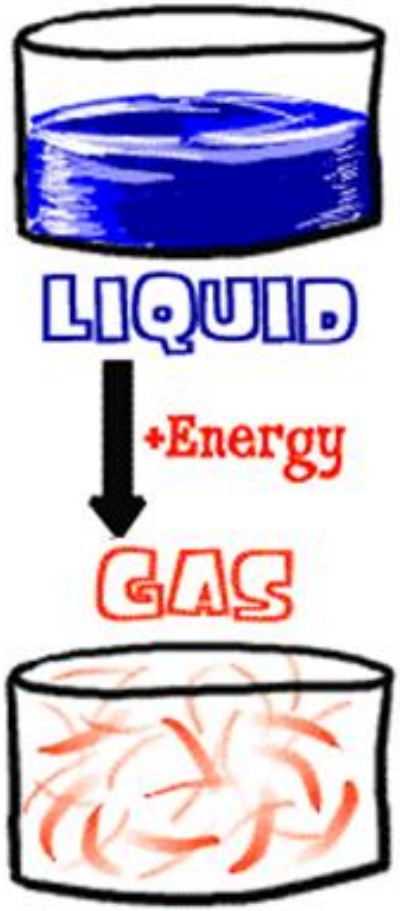
When energy is taken away, particles in matter move slower!



Solid + Energy = ?

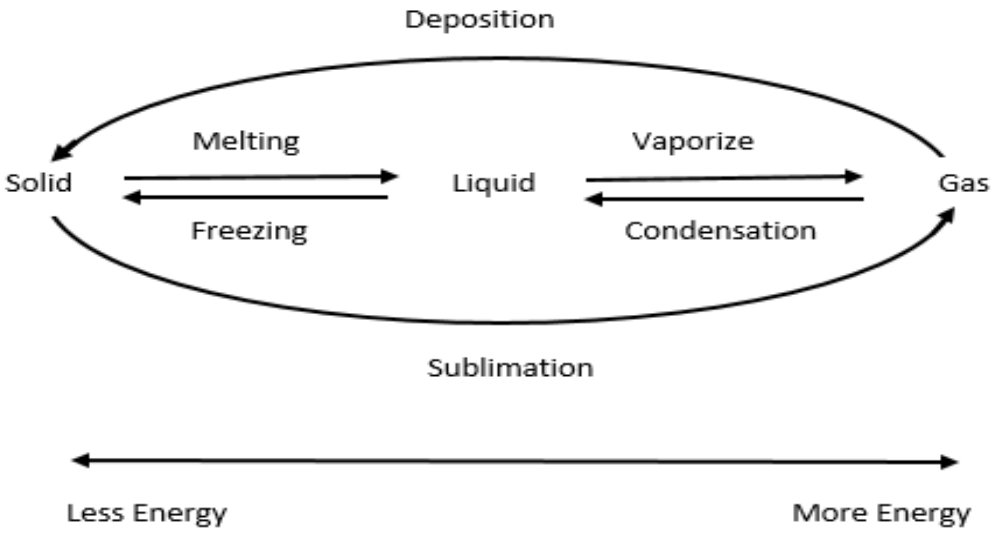
- When energy is added to solids, they become liquids!
- Examples?

Liquid + Energy = ?

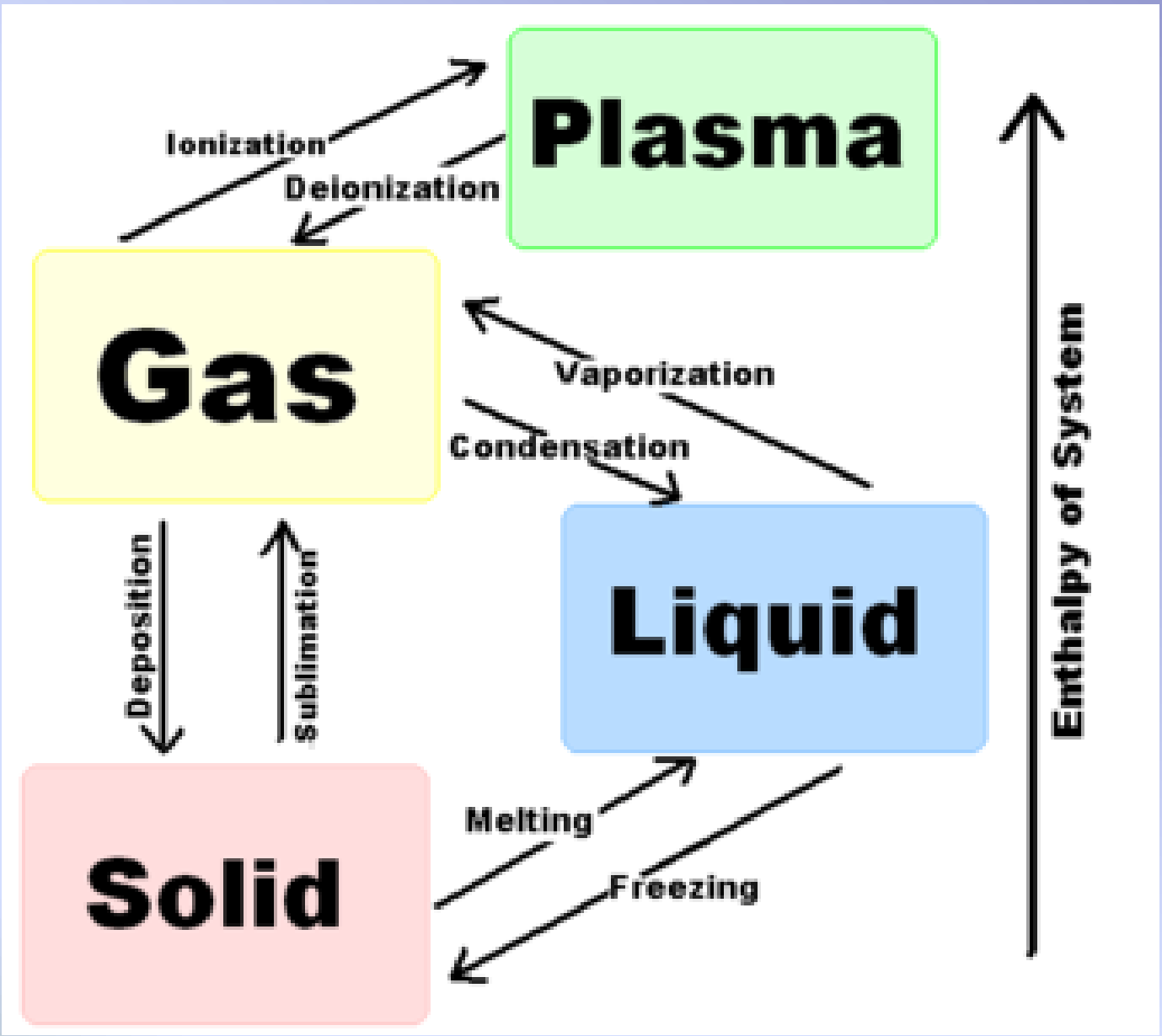


- When energy is added to liquids, they become gases!
- What examples can you think of?

Matter Changing Phases



- For a solid to become a liquid, the solid melts
- For a liquid to become a gas, the liquid boils or vaporizes
- For a gas to become a liquid, the gas condensates
- For a liquid to become a solid, the liquid freezes
- For a solid to become a gas without first becoming a liquid, the solid sublimates
- For a gas to become a solid without first becoming a liquid, the gas goes through deposition


Plasma
Ionization
Deionization
Gas
Vaporization
Condensation
Liquid
Deposition
Sublimation
Solid
Melting
Freezing
Enthalpy of System