

The image shows the cover of a spiral-bound notebook. The cover has a light beige, textured fabric-like appearance. A silver metal spiral binding is visible along the left edge. The text is centered on the cover.

# Matter and Energy

Chapter 2.2

# Kinetic Theory

1. All matter is made up of atoms and molecules that act like tiny particles.
2. These tiny particles are always in motion. The higher the temperature, the faster the particles move.
3. At the same temperature, more massive (heavier) particles move slower than less massive (lighter) particles.

# Three States of Matter

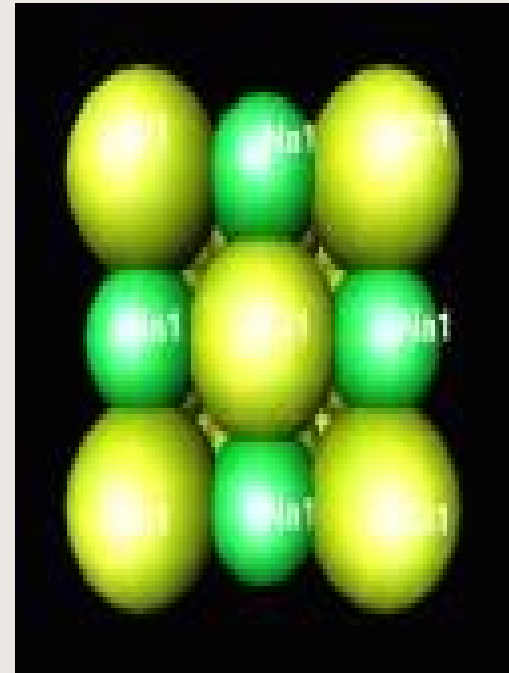
- **Solid**: Molecules and Atoms are Packed very closely together. Are in a fixed Position
- **Liquid**: Molecules and Atoms are close together but **can** move past each other.
- **Gas**: Molecules and Atoms are in constant motion and rarely stick together

# Gas

- Gas is free to spread in all directions
- Gas will expand to fill available space
- Lighter gases Move faster.
  - Ex:  $O_2$  moves at about 500 m/s
  - He moves at about 1200 m/s

# Solids

- Are in a fixed position because there is no space for atoms or molecules to move past each other



# Liquids

- Classified as a fluid (along with gases)
  - Have the ability to move freely
- Viscosity: the resistance of a fluid to flow
  - High viscosity = slow flow (ex. – Honey)
  - Low viscosity = flows easily (ex. – H<sub>2</sub>O)

# Energy

- The ability to change or move matter
  - Examples:
    - Electricity
    - Wood
    - Food

# Energy & Matter Change

- Energy must be added to a substance to cause a change in state.
  - Melting: Change of a substance from a solid to a liquid
  - Evaporation: Change of a substance from a liquid to a gas



# Energy & Matter Change (2)

- Energy is transferred in all changes of states.
  - Condensation: Water vapor loses energy and changes to a liquid
  - Freezing: Liquid changes to a solid
  - Sublimation: The change of a substance from a solid to a gas



# Law of Conservation of Mass

---

- Mass cannot be created or destroyed
  - Example: Boiling water or burning a match.

# Law of Conservation of Energy

---

- Energy cannot be created or destroyed