Introduction to Matter
What is Matter?

• **Matter** – anything that takes up space, has mass, and...

• Has measurable properties
  – Chemical
  – Physical

• Anything that is NOT matter is ________________
Physical vs. Chemical Properties

**Physical Property:** a characteristic that can alter the appearance of a substance but not its composition

**Chemical Property:** a characteristic that allows a substance to form into another substance

- **Examples:**
  - Phase changes
  - Separating mixtures
  - Reactivity
  - Corrosion
  - Flammability
Physical vs. Chemical Change

• Physical change: change to matter that is reversible

• Chemical change: change to matter that is irreversible
Types of Chemical Reactions

Activation Energy - The Energy required to initiate a chemical reaction. Both endothermic and exothermic reactions require activation energy.
Exothermic vs. Endothermic Reactions

Exothermic Reactions?

ADD ENERGY

Melting

Evaporation

Ice

Water

Water Vapor

Freezing

Condensation

REMOVE ENERGY
Atoms - the smallest component of all matter

- **Neutrons**
  - no charge
  - in nucleus

- **Protons**
  - positive charge
  - In nucleus
  - Determines identity of element

- **Electrons**
  - negative charge
  - orbit nucleus
  - Gives matter physical & chemical properties
Just how small is an atom?
Classification of Matter by Composition

Matter

Mixtures
- Heterogeneous Mixture
  - Suspensions
- Homogeneous Mixture
  - Solutions

Pure Substance
- Compounds
  - Molecules/Formula Unit
- Elements
  - Atoms
Definitions to Know

Pure Substances: Atom, Element, Compound, Molecule
States of Matter

**Solids**
- Incompressible
- Rigid, tightly packed particles
- Particles vibrate around fixed points; very little movement
- Fixed shape
- Fixed volume

**Liquids**
- Incompressible
- Loosely packed particles
- Particles are able to move about the volume; ability to flow
- Takes the shape of its container
- Fixed volume

**Gases**
- Compressible
- Particles have no attraction to each other
- Particles move freely, ability to flow
- Fills the shape of its container
- Volume depends on size of container
Changing States of Matter

Evaporation → Condensation
Freezing ← Sublimation
Melting → Deposition