MATTER

Anything that has mass and volume Exists in three physical states: solid, liquid, gas

MIXTURES

Two or more elements or compounds in variable proportions Components retain their properties

Heterogeneous Mixtures

- Visible parts
- Differing regional composition

Homogeneous Mixtures (Solutions)

- No visible parts
- Same composition throughout

PHYSICAL CHANGES

Filtration Extraction Distillation Crystallization Chromatography

PURE SUBSTANCES

Fixed composition throughout

Elements

- · Composed of one type of atom
- Classified as metal, nonmetal, or metalloid.
- Simplest type of matter that retains characteristic properties
- May occur as individual atoms or as molecules
- Atomic mass is average of isotopic masses weighted by abundance

Compounds

- Two or more elements combined in fixed parts by mass
- Properties differ from those of component elements
- Molecular mass is sum of atomic masses

CHEMICAL CHANGES

Atoms

- Protons (p⁺) and neutrons (n⁰) in tiny, massive, positive nucleus; number of p⁺ = atomic number (Z)
- Electrons (e⁻) occupy surrounding volume; number of p⁺ = number of e⁻

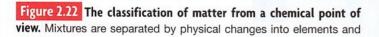
Ionic Compounds

- Solids composed of cations and anions
- lons arise through e⁻ transfer from metal to nonmetal

Covalent Compounds

- Often consist of separate molecules
- Atoms (usually nonmetals) bonded by shared e⁻ pairs





compounds. Chemical changes are required to convert elements into compounds, and vice versa.