

### 3 States of Matter

State	Definition	Examples
Solid	rigid; has a fixed shape and volume	ice cube, diamond, iron bar
Liquid	has a definite volume but takes the shape of its container	gasoline, water, blood
Gas	has no fixed volume or shape; takes the shape of its container	air, helium, oxygen

### Module 2 - Isotopes, Compounds, Empirical Formula

Atoms have a constant or fixed number of protons  
 Atomic Number - gives the protons in the nucleus of an atom; represented as **Z**  
 Neutral Atom - number of protons is equal to the number of electrons  
 $Z = \text{nuclear charge} = \text{number of protons} = \text{number of electrons in neutral form}$   
 Mass Number - sum of the number of protons and neutrons; represented by **A**  
 An atom can be represented by the nuclear symbol  ${}^A_Z\text{E}$   
 Nucleons - protons + neutrons

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### Types of bonds

Ionic	when one atom shifts or transfers an electron to another atom; metals + nonmetals	$\text{Na}^+$ (1A) and $\text{Cl}^-$ (7A) creates a stable bond (octet rule)
Covalent	atoms share electrons; nonmetals	$\text{O}_2$ -(6A) and 2 atoms of $\text{H}^+$ (1A) = $\text{H}_2\text{O}$
Metallic	a metal shares an electron with another metal; positively charged ions in electrons	

### Mixture and Pure Substances

Mixture	has variable composition	
Homogeneous	also called a solution; does not vary in composition from one region to another	
Heterogeneous	contains regions that have different properties from those of other regions	
Pure Substance	always have the same composition; either elements or compounds	

### Other Properties

Extensive	changes when the amount of material changes	mass, length, volume, shape
Intensive	does not depend on the size of the material	temperature, odor, color, hardness, density

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### Physical and Chemical Properties and Changes

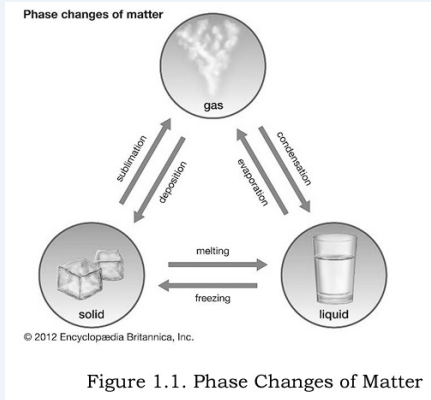
Physical Properties	odor, color, volume, state (gas, liquid, or solid), density, melting point, boiling point	
Chemical Properties	burning, digestion, fermentation, rusting, electrolysis	

### Elements and Compounds

Elements	cannot be broken down into other substances by chemical means	iron, aluminum, oxygen, and hydrogen
Compound	substances that have the same composition no matter where we find them; can be broken down into elements	Water ( $\text{H}_2\text{O}$ ), Salt ( $\text{NaCl}$ ), Ammonia ( $\text{NH}_3$ )



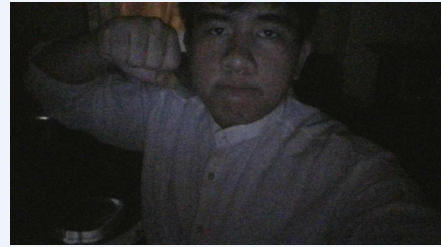
## Phase Changes of Matter



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## Module 1 - Matter and its Properties

Matter - has mass and occupies space.

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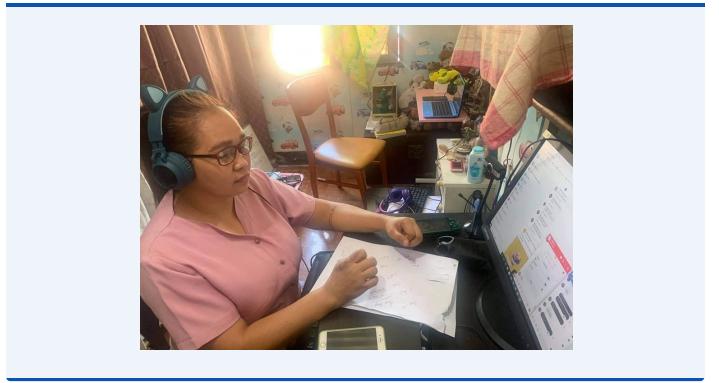
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