2.1 – Properties of Matter

Substances

What is matter?
Anything with mass that takes up space.

Pure substance: Matter with unchanging and uniform composition.

Is water a pure substance?
- Distilled water – Yes – Hydrogen and Oxygen
- Tap water – No – Different minerals at different locations
- Sea water – No – Different components – organisms, minerals, etc.

States of Matter
Matter occurs in different forms:
- Solid: Definite shape and volume
- Liquid: Definite volume, takes shape of its container, flows.
- Plasma: Gas like state of matter where atoms have been separated from their electrons. Stars, Eye of the Storm. Demo: Jacob’s Ladder.

Gas vs. Vapor
Gas - exists as only a gas at room temperature (Or whatever temperature the conditions are set to).
Vapor - gaseous form of a solid or liquid at room temperature. Example: Water can be in gaseous form at room temperature or lower.

States of Matter - Pictorial
Sublimation
Melting → Liquid → Vaporization → Gas → Ionization → Plasma
Freezing → Solid → Condensation
Deposition

Physical Properties of Matter
Can be observed or measured without changing the sample’s composition.
Examples?
Density, color, hardness, melting/boiling point, shape, crystal structure.
Physical Property Types

**Extensive property** – Depends on amount of substance present. Ex: Length, mass, volume.

**Intensive property** – Independent of amount of sample. Ex: Density, color, crystal structure, melting point.

Chemical Property

Ability of a substance to combine with or change into one or more other substances. Ex. Iron forming rust. How is this a chemical change?

Copper Questions:

Which are chemical properties? Which are physical?
Copper is reddish brown and shiny – Physical
Its density is 8.92 g/mL – Physical
Its melting point is 1,085 °C – Physical
It forms green copper carbonate when in moist air – Chemical
It makes new substances with nitric acid – Chemical
It’s a good conductor of heat and electricity – Physical

Demo: Dropping CaC_2 into H_2O

Make observations and decide if you are seeing chemical or physical change.

States of Matter - Jumble

Help! The states of matter have been scrambled into an unidentifiable mess! Can you unmess them?
Move words and shapes around, and connect them with arrows.

Homework

Read 3.1 & 3.2 of your book
2.1 Problems in your Booklet
Due: Next Class.