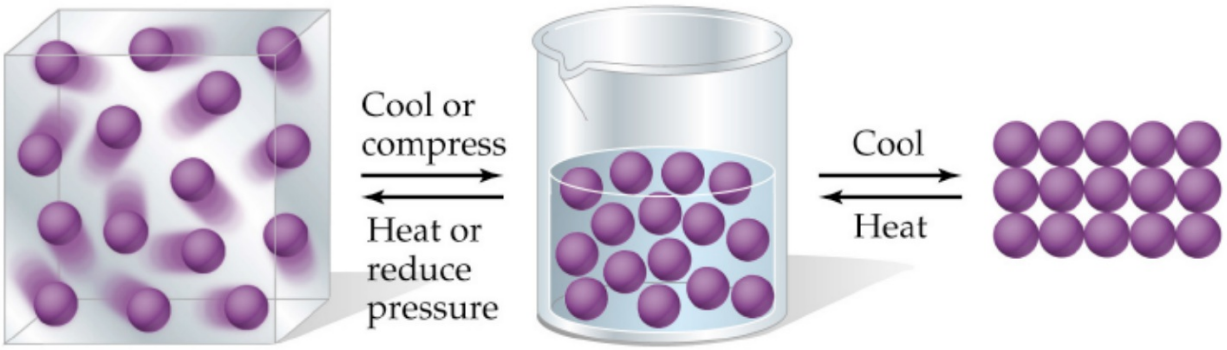
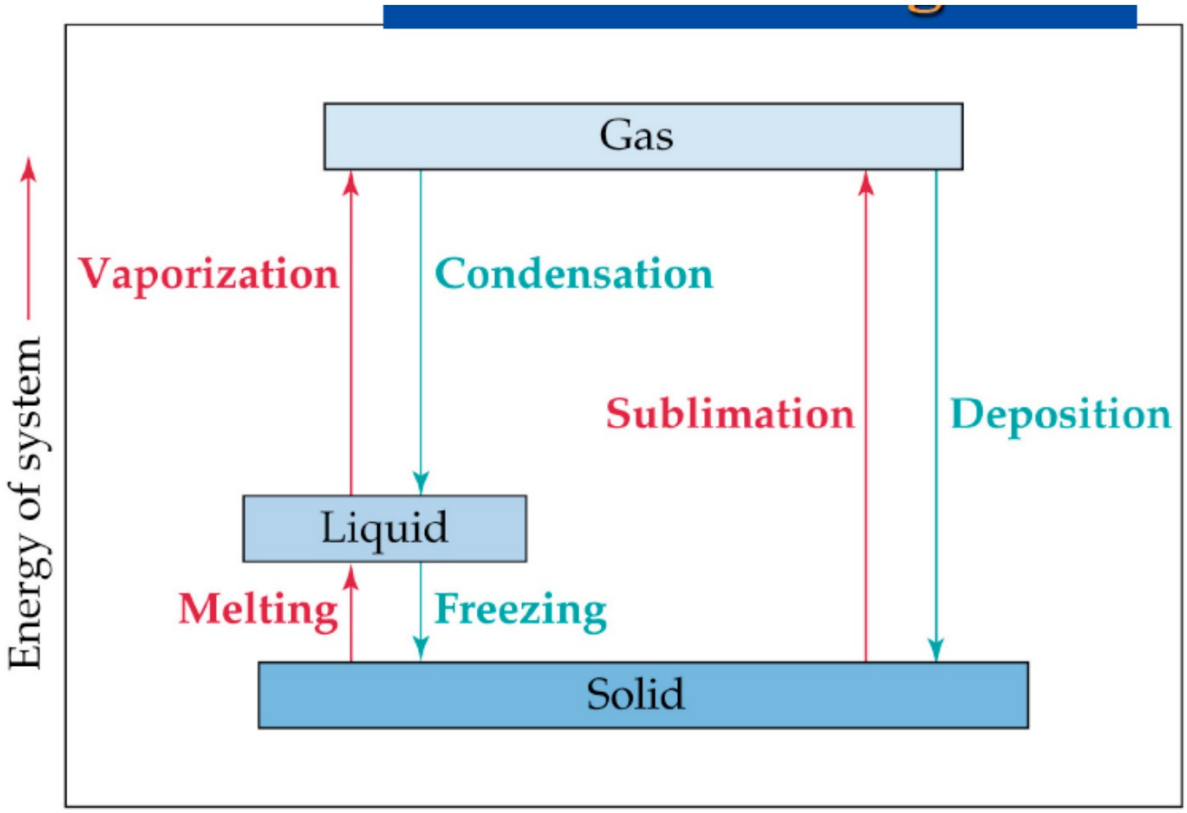
IB Chemistry Lesson 1.1

States of Matter

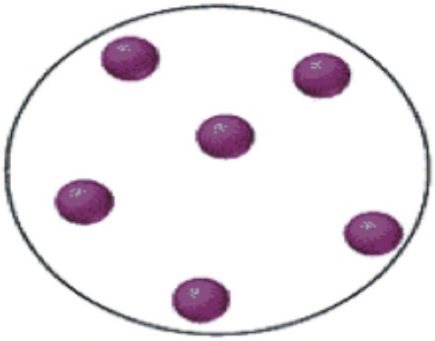


Gas	Liquid	Crystalline solid
Total disorder; much empty space; particles have complete freedom of motion; particles far apart	Disorder; particles or clusters of particles are free to move relative to each other; particles close together	Ordered arrangement; particles are essentially in fixed positions; particles close together

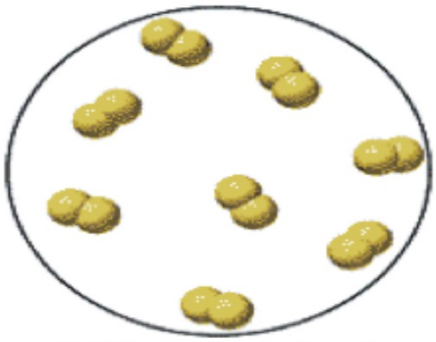
Changes of State



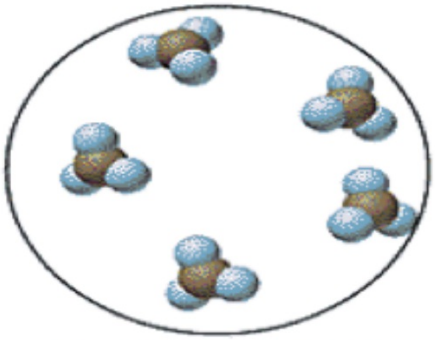
Elements, Compounds, and Mixtures



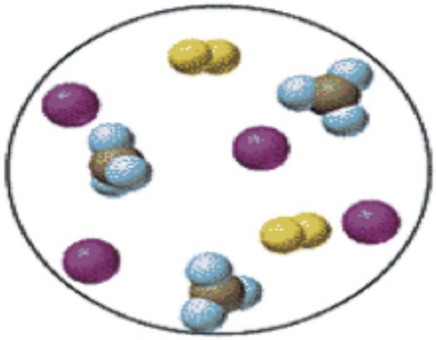
A Atoms of an element



B Molecules of an element



C Molecules of a compound



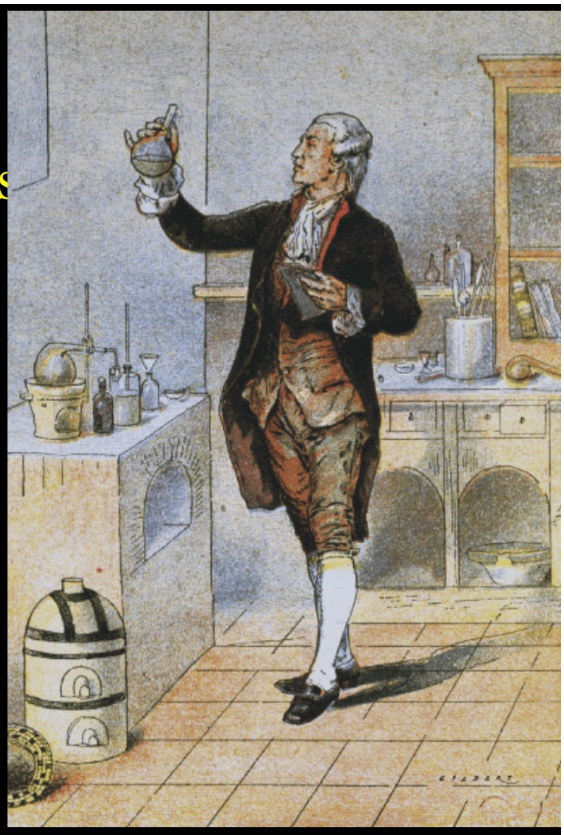
D Mixture of two elements and a compound

Antoine Lavoisier: mass is conserved in a chemical reaction.

Chemical equations: descriptions of chemical reactions.

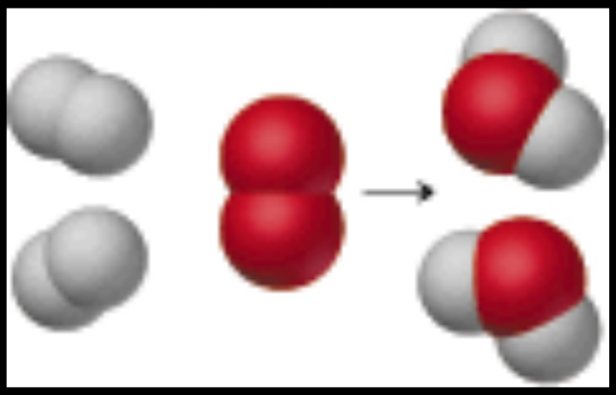
Two parts to an equation: reactants and products:

$$2H_2 + O_2 \rightarrow 2H_2O$$



The chemical equation for the formation of water can be visualized as two hydrogen molecules reacting with one oxygen molecule to form two water molecules:

$$2H_2 + O_2 \longrightarrow 2H_2O$$



$$2Na + 2H_2O \rightarrow 2NaOH + H_2$$
$$2K + 2H_2O \rightarrow 2KOH + H_2$$

Stoichiometric coefficients: numbers in front of the chemical formulas; give ratio of reactants and products.

Example: $\underline{2}K + \underline{2}H_2O \rightarrow \underline{2}KOH + H_2$

Why is there no coefficient here?

BALANCE THE FOLLOWING EQUATIONS:

1. $\_KClO_3 \rightarrow \_KCl + \_O_2$

2. $\_N_2 + \_H_2 \rightarrow \_NH_3$

3. $\_Ca_3(PO_4)_2 + \_NaOH \rightarrow \_Na_3PO_4 + \_Ca(OH)_2$

4. $\_K + \_H_2O \rightarrow \_KOH + \_H_2$

What Balanced Equations Tell Us

- Balanced chemical equations give number of molecules that react to form products.
- Interpretation: ratio of number of moles of reactant required to give the ratio of number of moles of product.
- These ratios are called *stoichiometric ratios*.
- Example: $2H_2 + O_2 \rightarrow 2H_2O$
  - 2 moles (or molecules) of hydrogen react with one mole (or molecule) of oxygen to produce 2 moles (or molecules) of water.