IB / AP Chemistry [Keep for Reference]

Matter and Measurement

BLUFFER’S GUIDE

1. Matter

Normally exists in 3 physical states:

**Liquid-**

Fixed volume, Fluid; Takes on the shape of lower part of container; well-defined surface

**Solid**

**­**Rigid Shape; very little volume change as temperature and pressure change

**Gas**

Volume expands to fill the container; volume varies according to temperature and pressure

**Kinetic Molecular Theory**

The idea that matter consists of molecules or atoms that are in constant, random motion.

**Kinetic Energy** = Energy of motion; higher temperature = *more* motion

**Macroscopic** – seen with the eyes.

**Microscopic** – seen with a microscope

**Particulate or Submicroscopic** – Structures at the atomic level (what we think about)

**Mixtures**

**Heterogeneous Mixture** – A mixture where the properties of the mixture vary throughout. (Like an Oatmeal cookie, the different components are visible)

**Homogeneous Mixture** – Also called a **solution**, where the components mix at a molecular level; different properties of the mixtures are unnoticeable.

**Purification** – The separation of a mixture into its components. (techniques: distillation, filtration, & chromatography)

2. Elements

A substance that cannot be decomposed further by chemical means

Names given by symbols: *Example: Helium = He, Gold = Au, Aluminum = Al*

3. Physical Properties

Properties of a lone sample (ex. mass, volume, boiling temp, melting temp, conductivity, etc.)

Density is the physical property that relates the mass of an object to its volume

Density = Mass/Volume

**Extensive Property** – Properties, like mass and volume, that depend on the amount of substance

**Intensive Properties** – Properties like color and density; independent of the amount of substance

**Temperature --** how hot a substance is; physical properties (like density) vary with temp

**Celsius** 0°C for freezing point of water and 100°C for melting point of water.

 **Kelvin** – same scale as Celsius; 0°C = -273 K;
0 K = no motion; Celsius o + 273 = Kelvin

4. Chemical Properties

How substance *interacts* with other substances. Ex. forms gas with acid; burns in air, etc.

5. Physical and Chemical Change

**Physical Change –** where the identity of all the substances remains unchanged (melting, boiling, grinding, pounding into sheets, etc.)

 **Chemical Change (Reaction) –** atoms rearrange to convert one substance into another

 **Chemical Equation –** A representation of the chemical reaction taken place

*Example:* P4 + 6Cl2 → 4PCl3

6. Measurements/Calculations

**Accuracy** – how close to a “true value”; measured by **percent error**.

**Precision** – how close measurements are to each other. Measured by **significant figures or ± notation**. [I assume you know metric system.]

**Dimensional Analysis** – use of a conversion factor to change units (ex: metric conversions, mass & volume, time units, etc.)