

**Physical Properties of Matter:**

- Be able to distinguish between physical changes, chemical changes, physical properties & chemical properties.
- Describe the properties of the 4 states of matter (solid, liquid, gas, plasma) in terms of compressibility, diffusion, density, particle motion, etc.
- Use the KMT to describe the properties of solids, liquids and gases.
- Distinguish between crystalline and amorphous solids.
- Relate strength of IMF's to the states of matter
- Changes of state: Explain freezing, melting, sublimation, deposition in terms of the KMT. Include the terms endothermic and exothermic.
- Define boiling point, condensation point, freezing point and melting point. Distinguish between boiling point and normal boiling point etc.
- Be able to sketch a heating/cooling curve for some substance given its melting point and boiling point. Label all states, and changes of state.
- Describe, on a particle level, the factors affecting melting and boiling points (IMF's, mass, ionic/covalent, polar/non-polar, etc)
- Define vapour pressure in terms of the KMT and explain factors that affect the rate of vapourization.
- Be able to read a manometer and convert between units of pressure.
- Use a vapour pressure graph to determine strength of IMF's, normal boiling points, etc.

**Gases and the Atmosphere:**

- Briefly describe how the atmosphere has changed.
- Identify the gases that make up our atmosphere.
- Discuss global warming, and initiatives to improve air quality.
- Name the major scientists and their major contribution to the study of gases.
- Gas laws:
  - Know the relationships between pressure, temperature and volume of gases (inverse/direct)
  - Solve problems using the relationships (Boyle's, Charles', Gay-Lussac's and the combined gas law)
- Know the various units of pressure, and be able to convert between them.
- Know standard atmospheric pressure in various units.

### **Chemical Reactions:**

- Calculate the average atomic mass of an isotope and the relative abundance of each element.
- Know the applications of a few isotopes
- Naming Compounds: Be able to name and write formulas for Ionic, covalent compounds, including varied oxygen.
- Be able to determine the mass of an element/compound in amu or g/mol using your periodic table.
- Be able to write, identify, predict the products of and balance chemical reactions.
- Be able to convert between mass, moles, molecules, atoms, volume (of gases), and concentration.
- Determine the empirical and molecular formula given % composition, or mass data.
- Be able to solve stoichiometry problems, including heat problems, and limiting reagent problems.

### **Solubility:**

- Distinguish between solute, solvent, solution, homogeneous, heterogeneous.
- Describe with examples, the nine types of solutions.
- Describe the polar nature of water terms of its structure and electronegativity.
- Describe the dissolving process at the molecular level for ionic and covalent substances.
- Explain the dissolving process in terms of the heat of solution (exothermic/endothemic).
- Solubility of various substances → "like dissolves like"
- Describe factors affecting the rate of solution on the particle level.
- Describe factors affecting the solubility of a substance.
- Read and solve problems using a solubility curve.
- Describe freezing point depression and boiling point elevation on the particle level.
- Describe the various units for concentration (%w/w, %w/v, %v/V, ppm, ppb, mol/L)
- Solve problems involving concentration (mol/L)
- Solve stoichiometry problems involving concentration. Remember that 22.4l/mol only applies to gases NOT solutions!

### **Organic Chemistry:**

- Distinguish between organic and inorganic chemistry/molecules.
- Identify the major sources of hydrocarbons.
- Name and draw structures for Alkanes, Alkenes, Alkynes, Alcohols, Acids, and Esters.
- Discuss the physical properties of Alkanes, Alkenes, Alkynes, Alcohols, Acids, and Esters. (trends in solubility, melting point, boiling point, state, etc)
- Write esterification reactions
- Write dehydrogenation and hydrogenation reactions for alkanes, alkenes, alkynes.
- Differentiate between aliphatic and aromatic hydrocarbons.
- Identify monomers in a polymer
- Describe the process of polymerization (addition, condensation reactions)