

## SCH3U1 - Exam Review

### Unit 1 - Matter, Chemical Trends, and Chemical Bonding

1. **Evaluate** the risks and benefits to human health of some commonly used chemical substances such as food additives, pharmaceuticals, cosmetics, perfumes, and household cleaning products.
2. **Identify** a commonly used but potentially harmful chemical substance and **describe** how this chemical is used in society. **Describe** how this chemical affects the environment and **propose** a way to lessen the harmfulness of this chemical or **identify** an alternative substance that can be used for the same purpose.
3. **Define** the following terms:  
  
    **atomic number, mass number, isotope, radioisotope, isotopic abundance**
4. **State** Mendeleev's Law of Periodicity.
5. Using an example, **explain** the difference between valence number and the number of valence electrons.
6. **Explain** the octet rule.
7. **Explain** the following trends that exist as one moves across or down the periodic table.
  - a) atomic radius
  - b) ionization energy
  - c) reactivity
  - d) electron affinity
  - e) electronegativity
8. **Explain** the difference between an ionic and a covalent bond.
9. Use electronegativity values and Lewis diagrams to **predict** bond types.
10. **Compare** characteristics of ionic and covalent substances.
11. **Explain** the difference between intermolecular & intramolecular bonds.
12. Use IUPAC nomenclature to **name** compounds and **write** formula.

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### Unit 2 - Chemical Reactions

1. **Identify** and **describe** chemical reactions that are used in various industrial processes that have an impact on the health and safety of a local population.
2. **Identify** chemical reactions that are used to address social and environmental needs and problems and **assess** their effectiveness.
3. **Write** balanced chemical equations.
4. **Describe** the chemical tests for oxygen, hydrogen, and carbon dioxide gas.
5. **Identify** synthesis, decomposition, single displacement, double displacement, and combustion reactions.
6. **Understand** how to use the activity series for metals.
7. **Predict** the products of the various types of reactions given reactants.
8. **Explain** what is meant by the term “hydrocarbon”. Provide chemical formulae for 3 different hydrocarbons.
9. **Explain** the difference between complete and incomplete combustion. Include 2 chemical equations to assist with your response.
10. **Explain** why incomplete combustion occurs.
11. **Define** the following terms: acid, base, oxide (**provide** 2 examples of each)
12. **Write** general and specific equations representing reactions that result in the formation of acids and bases.
13. **List** characteristics of acidic & basic oxides.
14. **Write** a general and a specific equation representing neutralization.

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### *Unit 3 - Chemical Reactions*

1. **Identify and describe** a process in the home, the workplace, and the environmental sector that involves the use of chemical quantities and calculations.
2. **Identify and describe** an industrial process where quantitative accuracy is important. **Describe** the potential impact on the environment if quantitative accuracy is not observed.
3. **State** the law of definite proportions.
4. **Define** percent composition, mole, and molar mass.
5. **Explain** the difference between empirical & molecular formula.
6. **Review** the 3 quizzes and the unit test

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### Unit 4 - Solutions and Solubility

1. **Describe** the origins and cumulative effects of pollutants that enter our water systems (biological, physical, and chemical) and **explain** how these pollutants affect water quality.
2. **Analyse** economic, social, and environmental issues related to the distribution, purification, and use of drinking water.
3. **Outline** the steps involved in the purification of drinking water.
4. **Explain** the difference between
  - a) homogeneous & heterogeneous
  - b) solute & solvent
  - c) saturated, unsaturated, and supersaturated
  - d) concentrated & dilute
  - e) Arrhenius acid & Arrhenius base (**provide** 2 examples of each)
  - f) Strong & weak acid / base (**provide** 2 examples of each)
5. **Define** solution, solubility, precipitate
6. **Provide** examples of different types of solutions;
  - a) solid in solid
  - b) liquid in liquid
  - c) gas in gas
  - d) solid in liquid
7. **Explain** why water is considered to be the ideal solvent.
8. **Explain** why water dissolves latex but not oil based paints.
9. **Explain** how temperature affects the solubility of gases & solids
10. **Solve**  $C=n/V$  problems including those that involve the molar mass triangle ( $MM = m/n$ )
11. **Calculate** the volume of pure ethanol needed to make 7500 mL of a solution of ethanol in water that is 25% (v/v).
12. **Calculate** the mass of aluminum hydroxide required to make 10.00 L of a 1.00 mol/L solution.

13. **Calculate** the volume of a 12.0 mol/L solution HCl required to prepare 1.0 L of a 0.5 mol/L HCl solution.
14. **Use** Solubility Rules to **predict** precipitate formation.
15. **Write** balanced chemical equations representing precipitation reactions. Include the state of all participants. **Write** corresponding net ionic equations.
16. **Review** binary and oxyacid nomenclature.
17. **Review** the titration experiment.
18. During a titration, 15 mL of 0.15 mol/L  $\text{Ca}(\text{OH})_{2(aq)}$  is required to neutralize 30 mL of  $\text{HCl}_{(aq)}$ . **Calculate** the concentration of the hydrochloric acid.

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### **Unit 5 - Gases and Atmospheric Chemistry**

1. **List** the major and minor components that make up the Earth's atmosphere.
2. **Describe** a technology or human activity (smelting, driving gas powered vehicles) that affects air quality.
3. **Propose** a course of action that might reduce your "carbon footprint".
3. The Montreal Protocol and the Ontario Drive Clean Program are examples of Canadian initiatives designed to improve air quality and lower greenhouse gas emissions. **Describe** these 2 initiatives.
4. **Assess** air quality conditions for the city of Hamilton using Environment Canada's Air Quality Health Index.
5. **List** the postulates (points) of the Kinetic Molecular Theory of Gases.
6. **Describe** the characteristics of gases.
7. **Define** the following terms:  
  
pressure, temperature, absolute temperature, STP, standard boiling point, standard molar volume
7. **State** the S.I. units for pressure.
8. **Convert** pressure units.
9. **Convert** temperature units.
10. **Describe** the relationship that exists between the following;  
i) volume and pressure  
ii) volume and temperature  
iii) pressure and temperature
11. **Sketch** 2 separate graphs which illustrate the difference between Boyle's law and Charles's law.
12. **State** the following gas laws using equations and sentences;  
Dalton's law of partial pressures, Boyle's law, Charles law, Gay-Lussac's law, Gay-Lussac's law of combining volumes, Avogadro's law.
13. **Solve** problems involving Boyle's law, Charles's law, Gay-Lussac's law, Combined gas law, Dalton's law.
14. **Solve** volume/volume stoichiometry problems.
15. **Solve** standard molar volume ratio problems.
16. **Solve** Ideal gas law problems.