Topics and Mark Breakdown for the SCH 3UI EXAM June 2019

Unit 1: Matter, Chemical Trends, and Chemical Bonding
Exam Marks Breakdown

Multiple Choice	Short Answer
8	2 – 9 marks

❒ use appropriate terminology related to chemical trends and chemical bonding, including: atomic radius, electronegativity, ionization energy, and electron affinity

❒ draw Lewis diagrams to represent the bonds in ionic and molecular compounds

❒ predict the nature of a bond (e.g., non-polar covalent, polar covalent, ionic), using electronegativity (EN) values of atoms

❒ explain the relationship between the atomic number and the mass number of an element, and define isotopes

❒ calculations involving average atomic mass

❒ explain how patterns in the electron arrangement and forces in atoms result in periodic trends (e.g., in atomic radius, ionization energy, electron affinity, electronegativity) in the periodic table

❒ explain the differences between the formation of ionic and covalent bonds

❒ compare and contrast the physical properties of ionic and molecular compounds (e.g., NaCl and CH_4; NaOH and H_2O)

Nomenclature
Exam Marks Breakdown: these questions will appear throughout the exam in all the other units.

❒ write chemical formulae of binary and polyatomic compounds, including those with multiple valences, and name the compounds using the International Union of Pure and Applied Chemistry (IUPAC) nomenclature system

❒ write chemical formulae of binary and oxy acids and bases using the International Union of Pure and Applied Chemistry (IUPAC) nomenclature system

Unit 2: Chemical Reactions
Exam Marks Break-Down

Multiple Choice	Short Answer
8	1- 15 marks

❒ write balanced chemical equations to represent synthesis, decomposition, single displacement, double displacement, and complete combustion reactions, using the IUPAC nomenclature system

❒ predict the products of different types of synthesis and decomposition reactions (e.g., synthesis reactions in which simple compounds are formed; synthesis reactions of metallic or non-metallic oxides with water; decomposition reactions, in which a chemical compound is separated into several compounds)

❒ predict the products of single displacement reactions, using the metal activity series and the halogen series

❒ predict the products of double displacement reactions using the solubility guidelines, the formation of precipitates or gases and neutralization reactions

❒ identify various types of chemical reactions, including synthesis, decomposition, single displacement, double displacement, and complete and incomplete combustion

❒ explain the difference between a complete combustion reaction and an incomplete combustion reaction (e.g., complete and incomplete combustion of hydrocarbon fuels)

❒ explain the chemical reactions that result in the formation of acids and bases from metal oxides and non-metal oxides (e.g., calcium oxide reacts with water to produce a basic solution; carbon dioxide reacts with water to produce an acidic solution)

Unit 3: Quantities in Chemical Reactions
Exam Marks Breakdown

Multiple Choice	Short Answer
8	2 – 21 marks

❒ use appropriate terminology related to quantities in chemical reactions, including: stoichiometry, percentage yield, limiting reactant, mole, and atomic mass

❒ solve problems related to quantities in chemical reactions by performing calculations involving quantities in moles, number of particles, and atomic mass

❒ determine the empirical formulae and molecular formulae of various chemical compounds, given molar masses and percentage composition or mass data

❒ calculate the corresponding mass, or quantity in moles or molecules, for any given reactant or product in a balanced chemical equation as well as for any other reactant or product in the chemical reaction

❒ solve problems related to quantities in chemical reactions by performing calculations involving percentage yield and limiting reactant

❒ describe the relationships between Avogadro's number, the mole concept, and the molar mass of any given substance

❒ explain the relationship between the empirical formula and the molecular formula of a chemical compound

Unit 4: Solutions and Solubility
Exam Marks Breakdown

Multiple Choice	Short Answer
8	3 – 23 marks

❒ use appropriate terminology related to aqueous solutions and solubility, including: concentration, solubility, precipitate, solute, and solvent

❒ solve problems related to the concentration of solutions by performing calculations involving moles, and express the results in various units (e.g., moles per litre, parts per million or parts per billion, mass-mass percent, volume-volume percent and mass-volume percent)

❒ know the experimental procedure required to prepare solutions of a given concentration by dissolving a solid solute in a solvent or by diluting a concentrated solution

❒ know the names of the scientific equipment used to make a solution (e.g. volumetric flask, pipette and burette)

❒ write balanced net ionic equations and total ionic equations to represent precipitation reactions and be able to identify the spectator ions

❒ use stoichiometry to solve problems involving solutions, solubility and concentration (titrations)

Unit 5: Gases and Atmospheric Chemistry
Exam Marks Breakdown

Multiple Choice	Short Answer
8	3 – 16 marks

❒ use appropriate terminology related to gases including: standard temperature, standard pressure, standard molar volume, and ideal gas (also SATP)

❒ solve quantitative problems by performing calculations based on Boyle's law, Charles' law, Gay-Lussac's law, the combined gas law, Dalton's law of partial pressures, and the ideal gas law

❒ use stoichiometry to solve problems related to chemical reactions involving gases (e.g., problems involving moles, number of atoms, number of molecules, mass, and volume)

❒ use stoichiometry to solve problems related to determine the molecular formula of a gas

❒ use the kinetic molecular theory to explain the properties and behaviour of gases in terms of types and degrees of molecular motion

❒ describe, for an ideal gas, the quantitative relationships that exist between the variables of pressure, volume, temperature, and amount of substance

❒ explain Dalton's law of partial pressures, Boyle's law, Charles' law, Gay-Lussac's law, the combined gas law, and the ideal gas law

The following tables will be provided on the Exam
- Activity Series of Metals
- The General Solubility Guidelines
- Electronegativity Values
- The Periodic Table of the Elements
- The Periodic Table of the Ions, including the common polyatomic ions