

Term 1Module 1 Fundamentals in Chemistry

Week # Date	Topic	Objectives	Assessment/Activity
1	Chapter 1 Fundamentals in chemistry 1. Classical models of the atom 2. Subatomic particles	<ol style="list-style-type: none"> 3. Compare the properties of electrons, protons and neutrons in terms of their relative charges, masses and behaviour in electric and magnetic fields. 4. Distinguish between atomic number and mass number 5. Discuss the concept of isotopes and give examples 6. Summarize Dalton's Thompson's and Rutherford's models of the atom and give limitations of each. 7. Outline the Bohr theory and model of the atom and explain how it accounted for the absorption and emission spectra of hydrogen. 	<p>Homework: hand out calculations involving:</p> <ol style="list-style-type: none"> a. Numbers of sub atomic particles, RAM given the mass of the isotopes of an element. b. energy wavelength and frequency of electromagnetic radiation c. Introduce planning and design Lab
2	Chapter 2 The quantum atom and the Periodic table	<ol style="list-style-type: none"> 1. Perform, calculations using energy, wavelength and frequency of electromagnetic radiation, using $E=h\nu$ 2. State and explain the origins of the Lyman Balmer and Paschen series in the hydrogen spectrum 3. state the Pauli exclusion and the Aufbau principles 4. write the electron configuration of a given atom or ion given its atomic number 5. illustrate the electron configuration using an electron diagram 6. Sketch the periodic table, illustrating the blocks and the elements in each group. 7. Discuss periodic trends in atomic and ionic radii. 8. Define ionization energy, electron affinity, electronegativity 	<p>Test chapter 1 atomic structure</p> <p>Assignment: writing electronic configurations of neutral atoms</p> <p>Video on wave particle duality</p> <p>Quantum theory</p>

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3	Chapter 2 The quantum atom and the Periodic table	9. Explain the general periodic trends in ionisation energy and electron affinity among the main group elements 10. State the periodic trends in electronegativity 11. Explain, using the elements of period 3 as an example, how ionization data can provide evidence for sub-shells 12. Predict the electronic configuration of an element from data on successive ionization energy.	Test chapter 2
4	Chapter 3 Radioactivity	1. Explain why some atomic nuclei are unstable 2. Define isotope and nuclide 3. Distinguish between α , β , and γ radiations and explain their origins 4. Write symbols for subatomic particles and nuclides 5. Write simple nuclear equations 6. Describe selected uses of radioactive nuclides	<u>Hand out</u> on writing equations showing α and β decay Assignment: <i>Home work Sheet</i> Calculate the half-life of radioactive elements writing nuclear equations IA Ionic and Covalent compounds
5	Chapter 4 Chemical Bonding	1. Explain the origin of the forces which act a chemical bonds. 2. Describe ionic, covalent, van der Waals forces and metallic bonds 3. Explain the relationship between physical properties of materials and the bonding which they contain	Test Chapter 3 IA <u>Hydrogen bonding in water</u> and its high specific heat capacity
6 & 7	Chapter 5 Shapes of Covalent compounds	1. Write the Lewis structure for covalent molecules and ions 2. Predict the geometrical shape and bond angles of simple molecules and ions using the VSEPR theory 3. Outline the basic principles of hybridization and resonance 4. Predict Polarity of a molecule based on its molecular structure	Test Chapter 4 PPT shapes of covalent compounds Video on hybridisation and shapes of molecules Assignment to predict the shapes of molecules

Week # Date	Topic	Objectives	Assessment/Activity
8 & 9	Chapter 6 An Introduction to the mole	<ol style="list-style-type: none"> Define <ol style="list-style-type: none"> Mole Molar mass Limiting reagent Empirical formula Theoretical and actual yield Calculate RMM Write balanced chemical equation Interconvert mass, moles and number of particles Calculate mass and molar concentrations of solutions 	IA: find the molecular formula of magnesium oxide by experimenting To find the equation for the reaction between lead (II) nitrate and potassium iodide Homework Molar calculations to be graded.
10 & 11	Chapter 7 Gases	<ol style="list-style-type: none"> Interconvert units of pressure Outline how the pressure of a gas is determined by using a manometer Calculate the pressure, volume, moles of a gas or temperature using the ideal gas law given the other 3 variables Perform stoichiometric calculations relating the mass of a reactant to the mass, moles, volume or pressure of a gaseous product Use the ideal gas law to calculate the molar mass of a gas. Use the kinetic theory of gases to explain each of the gas laws Explain the difference between real and ideal gases. 	Student: ppt on gas laws Class work exercise On calculations using the gas laws IA: Planning and Design lab
12 & 13	Chapter 8 Thermochemistry	<ol style="list-style-type: none"> Explain the concept of temperature Distinguish between <ol style="list-style-type: none"> Heat and heat capacity Heat and work State the Law of <ol style="list-style-type: none"> 1st Thermodynamics Conservation of energy Hess Define 	IA Heat of and heat of solution IA Revision for exam

Week # Date	Topic	Objectives	Assessment/Activity
		a. State functions b. Energy c. thermochemistry d. Enthalpies of reaction e. Standard state enthalpies of reaction 5. Describe how to measure heat with a calorimeter 6. Illustrate, using energy profile diagrams, the concepts of exo and endothermic reactions	
Term 2 Module 1 Fundamentals in Chemistry			
1 & 2	Chapter 9 Chemical Kinetics	1. Explain what is meant by the rate, half-life and order of a reaction 2. Apply the collision theory to explain factors affecting reaction rate. 3. Use the concept of the Boltzmann distribution theory in reaction rates 4. Understand the information contained within a reaction profile 5. Distinguish between 1 st order and pseudo 1 st order reactions 6. Describe how to find the order of a reaction from experimental data	IA rates of reactions a. Effect of concentration b. Catalyst c. Video on determining order of reactions Test on chemical kinetics
3 & 4	Chapter 10 Chemical equilibrium	1. Explain what is meant by a. Chemical equilibrium b. equilibrium constant 2. List the characteristic of a chemical reaction when it is at equilibrium 3. State and use Le Chatelier's Principle	Test chapter 9 IA Le Chatelier's Principle (AP) chemistry kit Thermometric titration

5 & 6	Chapter 11 Acid/base equilibria	<ol style="list-style-type: none"> 1. Define <ol style="list-style-type: none"> a. Acid b. Base c. pH d. indicator e. buffer f. common ion effect g. solubility product 	Quiz Le Chatelier's Principle I/A Acid base titration IA buffer solutions
7	Chapter 12 Redox equilibria	<ol style="list-style-type: none"> 1. Understand the reactions that take place in an electrochemical cell. 2. Explain how an accumulator and a dry cell works 3. Describe the standard hydrogen electrode 4. Describe methods used to measure standard electrode potentials 5. Calculate standard cell potentials from standard electrode potentials 6. Use standard electrode potential to determine electrons flow direction and feasibility of reactions 7. Predict how the value of an electrode potential varies with concentration. 8. Apply the principles of redox processes to energy storage devices. 	IA redox titration IA Redox reactions Galvanic cell Quiz Chapter 12
8	Chapter 13 Elements and Periodicity	<ol style="list-style-type: none"> 1. Describe the variations in physical properties of the period 3 elements in terms of structure and bonding 2. Describe the reactions of the elements with oxygen, water and chlorine 3. Predict the types of chemical bonding present in the oxides and chlorides 4. Describe the reactions of the oxides and chlorides with water 5. Explain the trend in acid/base behaviour of the oxides and chlorides 	IA reactivity of metals with HCl IA Reactivity of Halogens

Week # Date	Topic	Objectives	Assessment/Activity
9	Chapter 14 Elements and Periodicity: Group II & Chapter 18 Qualitative inorganic analysis	<ol style="list-style-type: none"> 1. Explain the variations in properties of the elements in terms of structure and bonding 2. Describe the reactions of the elements with oxygen, water and dilute acids/ 3. Explain the variation in the thermal decomposition of the carbonates and nitrates 4. Discuss the uses of some of the compounds of magnesium and calcium 	Reactivity of Group II elements Sulphates and Carbonates Quiz chapter 14 IA Unknowns Cations and Anions
10	Chapter 15 Elements and Periodicity: Group IV	<ol style="list-style-type: none"> 1. Explain the variations in properties of the Group IV elements in terms of structure and bonding 2. Describe the bonding in the Group IV tetrachlorides 3. Explain the reactions of the Group IV tetrachlorides with water. 4. Discuss the trends in bonding, acid/base character and thermal stability of the Group IV oxides of oxidation states +2 and +4 5. Discuss the relative stabilities of the oxides and aqueous cations of the Group IV elements in their higher and lower oxidation states 6. Discuss the uses of ceramics based on silicon (IV) oxide 	Quiz on elements in group 4 Ligand exchange IA Copper and Cobalt

11	Chapter 16 Elements and Periodicity : Group 7	<ol style="list-style-type: none"> 1. Explain the variation in properties of the Group 7 elements in terms of structure and bonding 2. Describe the reactions of the Group VII elements with hydrogen, water and dilute acids 3. Explain the relative reactivity's of the Group VII elements as oxidising agents 4. Explain the relative stabilities of the hydrides of the Group VII elements. 5. Describe the reactions of chlorine and the halide ions 	Deadline for IA's to be completed and handed in.
12	Chapter 17 The 1 st Row Transition elements	<ol style="list-style-type: none"> 1. Explain what is meant by a transition elements 2. Describe the electron configurations of typical transition elements 3. Describe the characteristic chemical properties of the transition elements 4. Describe the colour of the compound sand the variety of oxidation states 5. Explain what is meant by a coordination compound and describe selected properties 	IA Ligand exchange
13	Chapter 18 Qualitative inorganic analysis	Review qualitative inorganic analysis Onsight Moderation for CAPE 1 & II	Onsight Moderation
11		MOCK EXAMS	

RESEARCH PROJECTObjectives of the Research Project

The research project will allow students to:

1. appreciate the use of the scientific method for discovery of new knowledge and to the solution of problems.
2. communicate accurately and effectively the purpose and results of research.
3. analyse relevant literature.
4. apply experimental skills and theory to the solution of problems.
5. synthesise information based on data collected.
 - (a) The research project should focus on at least one specific objective in the Unit. It can be from one or more modules within the Unit.
 - (b) The project must not exceed 1500 words. The word count does not include: Tables, References, Table of contents, Appendices and Figures. Two marks will be deducted for exceeding the word limit by 200 words.
 - (c) Collaborative work is encouraged. Where collaborative work is done, group sizes must not exceed six (6) persons per group. The teacher is expected to use the group mark for the project and add it to the marks for the other skills for each individual candidate within the group.
 - (d) The report should be typewritten and double-spaced using 12pt font and should contain the following:
 - (i) Statement of Problem.
 - (ii) Rationale.
 - (iii) Research questions/Hypotheses.
 - (iv) Review of Literature.
 - (v) Methodology (paragraph format).
 - (vi) Presentation of Data collected from Research.
 - (vii) Discussion of findings.
 - (viii) Recommendations.
 - (ix) Conclusion.
 - (x) Bibliography (Referencing style from Communication Studies).

CRITERIA FOR MARKING THE RESEARCH PROJECT

1.	<i>Statement of Problem</i>		(2)
	<ul style="list-style-type: none"> • <i>Problem identified and clearly stated</i> <i>(Problem identified but not clearly stated)</i> 	2 (1)	
2.	<i>Rationale/Statements of Purpose of Investigation</i>		(1)
	<ul style="list-style-type: none"> • <i>Clearly states reason for project, for example, the benefits</i> <i>(Justifies solutions for the problem)</i> 	1	
3.	<i>Research Questions/ Hypotheses</i>		(3)
	<ul style="list-style-type: none"> • <i>Clearly stated research questions/hypotheses (no more than two)</i> • <i>Testable</i> • <i>Variables clearly stated</i> 	1 1 1	
4.	<i>Critical review of Literature (Analysis and evaluation of appropriate literature)</i>		(7)
	<ul style="list-style-type: none"> • <i>In text citation using consistent format</i> • <i>At least four sources cited</i> • <i>Credible and relevant sources (scholarly articles) cited</i> • <i>Analysis of information from sources eg. Who, what...</i> <ul style="list-style-type: none"> - <i>Comparison of information from sources cited</i> - <i>Accurate analysis of information from sources</i> - <i>Final synopsis of the literature</i> - <i>Personal reflection in relation to the area researched</i> 	1 1 1 1 1 1 1	
5.	<i>Methodology</i>		(3)
	<p><u><i>For Non-Experimental Research only</i></u></p> <ul style="list-style-type: none"> • <i>Clearly outlines method(s) of collecting data</i> <i>(Method only stated)</i> • <i>Methods chosen supported by literature review</i> <i>OR alternative method justified</i> <p><u><i>For Experimental Research only</i></u></p> <ul style="list-style-type: none"> • <i>Clearly describes method used</i> • <i>Repetition</i> • <i>Appropriate use of apparatus and materials</i> 	2 (1) 1 1 1 1	
6.	<i>Presentation of data collected from research</i>		(3)
	<ul style="list-style-type: none"> • <i>Appropriate format for presentation of data</i> • <i>Use of tables, graphs/figures</i> • <i>Properly annotated (Titles of tables at top; titles of figures at bottom of figure; Drawings labelled...)</i> 	1 1 1	

Unit 1: CAPE CHEMISTRY YEAR PLAN 2019 - 2020

Chemistry (Unit 1)	1+ 2+ 03/2***	19 May 07 May 08 May	AM (1 hr 30 min) PM (2 hr 30 min) AM (2 hr)
Chemistry (Unit 2)	1+ 2+ 03/2***+	08 June 11 May 29 May	PM (1 hr 30 min) PM (2 hr 30 min) AM (2 hr)