Form 4 Chemistry 2019 - 2020

Week	Topic	Objectives	Assessment
Week 1	Organic Chemistry introduction	**TERM 1** • List unique properties of carbon • Give examples of organic compounds • Note that carbon forms branched and un-branched chains and ring compounds • Describe the tetrahedral shape of methane. • Name sources of hydrocarbons • Define the terms: isomer; organic chemistry; homologous series, catenation; reforming; cracking; hydrocarbon; tetrahedral; functional groups; • Represent organic compounds using molecular, fully displayed, empirical and condensed structural formulae.	Quiz: on definitions
2	Organic Chemistry	• Give the main compounds containing carbon • List the general characteristics of the homologous series • Write the general formula and functional group of: alkanes, alkenes; alkynes; alcohols; aldehydes; ketones; carboxylic acids; esters; ethers; • Describe how crude oil is formed	Quiz: properties of Carbon **Quiz:** functional groups Osmosis & diffusion lab
3	Organic Chemistry Nomenclature	• Write molecular formulae of organic compounds. • Name the compounds of straight and branched hydrocarbon chains • Draw isomers of the compounds • List the uses of organic compounds	**Test** chapter B13 Introduction to organic chemistry page 226 - 237
4	Sources and Extraction of hydrocarbons	• Identify natural gas and petroleum as natural sources of hydrocarbons • Describe the fractional distillation of petroleum • List the main uses of the fractions obtained from the fractional distillation of petroleum • Distinguish between reforming and cracking; • Describe the thermal and catalytic cracking of alkanes	Experiment reactions of ethanoic acid
5	Organic Chemistry	**TERM 1** • List the chemical and physical	**Test on**

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	Alkanes	properties of alkanes • Describe and write equations for: Substitution; combustion & cracking • State the difference between saturated and unsaturated hydrocarbons • List the different petroleum products obtained from crude oil	**hydrocarbons Chapter B14 page 239 - 253**
6	Organic Chemistry reactions	• Describe the combustion of alkenes • Describe and write balanced chemical equations for the addition reactions of alkenes: hydrogenation: hydration; • Halogenations; • Hydro-halogenation	Lab Preparation of ethyne gas
7	Organic Chemistry Reactions of hydrocarbons	• Relate the characteristic reactions of alkanes and alkenes to their structure • Distinguish between alkanes and alkenes using bromine water, potassium permanganate or potassium dichromate.	**Quiz** Writing equations for the reactions of alkanes and alkenes
8	Organic Chemistry Alcohols acids and esters	• Identify alcohols by the presence of the hydroxyl group • Relate the properties of alcohols to their functional group • Describe and write balanced chemical equations for the reactions of ethanol: combustion; oxidation • State uses of alcohols	**Assignment naming of alcohols** **Lab**: Preparation of ethanol by fermentation
9	Organic Chemistry Alcohols, acids and esters	• Describe how ethanol can be prepared from ethene, and from the fermentation of carbohydrates • Describe the process of fermentation • Discuss the use and abuse of alcohol • List the effects of alcohol abuse	Demonstration page 258 To investigate the oxidation of ethanol
10	Organic Chemistry acids and esters	• Write equations for the acidic and non-acidic reactions of carboxylic acids • Deduce the hydrolysis products of an ester • Explain the process of saponification	Class assignment: Page 262 question 1 - 5 **Test** alcohols and acids
11	Organic Chemistry Esters	• Write names of esters based on the alcohol and acid that they are make from	assignment on naming of esters and drawing of structures **Quiz on alcohols acids and**

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		• Deduce the hydrolysis products of ester	**esters**
12	Organic Chemistry Soaps	• Explain the process of saponification • Discuss how a soap cleans • State the advantages and disadvantages of soapy and soapless detergents	Lab preparation of soap using oil. Page 266
13	Revision	Introduction to Organic Chemistry	**End of term exam**
Week 1	Organic Chemistry Polymers	**TERM 2** Define: polymer • Distinguish between ○ addition and condensation polymers ○ natural and synthetic polymers • Write equations for the formation of Polyethene and polypropene • Draw monomer units of ○ Polyethene ○ PVC ○ PTFE ○ Polypropene ○ Polystyrene • List 2 uses each of the above mentioned polymers	Quiz on polymers Lab: Preparation of nylon
2	Organic Chemistry polymers	• Distinguish between the monomer sugar and the polymer starch • Draw partial structures of protein and nylon • Relate the properties of polymers to their uses • Write equations for the hydrolysis of proteins and carbohydrates	Assignment: Make a table listing polymers, & monomer units, Name and Draw the structures of the monomers and partial structure of the polymer Circle the linkage Quiz: polymers
3	Condensation polymers	• Name and give the uses of ○ Polyesters ○ Nylon ○ Protein ○ Starch ○ Cellulose • Distinguish between ○ Simple sugars ○ Non-reducing sugars and ○ polysaccharides	Experiment Test for reducing and non-reducing sugars **Test:** Polymers Page 272 - 275
4	Environmental	• Distinguish between thermoplastics	Quiz: plastics

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	Impact of synthetic polymers	and thermosetting plastics • List advantages and disadvantages of using plastics	
5	Polyamides	• Name and draw structures of monomer units of Nylon • Explain the process of condensation polymerization • Show how monomers are linked in the structure of a polyester, polyamide and a polysaccharide • Give examples and uses of polyesters, synthetic and natural polyamides	Lab: Preparation of nylon Test Condensation polymers Page 275 - 279
6	Mole Concept	• Concentration ○ Mol/dm3 ○ g/dm3 • find the number of moles of a substance given its mass • calculate relative molecular mass	Homework mole calculations
7	Mole concept	• Write and interpret symbols for common ions and molecules • Explain the meaning of the mole as a chemical unit • Calculate the number of moles in a given mass of element or compound	Class work calculating moles and masses Lab reaction of iron and $CuSO_4$
8	Mole Concept	• Perform titration activities to determine the concentration of acids and alkalis • State the value of Avogadro's constant • Use balanced chemical equations to determine the mass of products formed	Quiz on concentration Symbols and molecules Mols ←→grams
9	Mole Concept	• Write ionic equations and determine the spectator ions in chemical reaction • Carry out calculations involving volumes of gases used in chemical reactions	Lab Acid base titration
10	Mole Concept	• Prepare standard solutions • Find mass and molar concentrations • Determine the empirical and molecular formula of compounds	Quiz ionic equations volumes of gases empirical and molecular formulae

11	Mole concept	• State Gay-Lussac's Law and use it to work out the volumes of gases in reactions • Write down Avogadro's Law and use it to change volumes into masses	Assignment worksheet
12	Mole Concept	• Revision of all mole concept topics/ • Complete revision questions	**Test** mole concept

13	Acids, Bases and Salts	• Define the terms acid:
		  ○ acid anhydride
		  ○ acid
		  ○ base
		  ○ salt
		  ○ Basicity of an acid
		• List common acids and their sources
		• Distinguish between strong and weak acids
			Lab Reactions of an acid

		TERM 3	
1	Acids, Bases and Salts	• List the properties of acid and bases • Distinguish between bases and alkali • Distinguish between concentration and strength of an acid	**Quiz**: definitions
2	Acids, Bases and Salts	• What is an indicator and what is it used for? • Describe the pH scale and its use with universal Indicator • Distinguish between normal, acid and basic salts	Assignment: Page 98 Examination style questions 1 – 3 Macmillan CXC Chemistry series
3	Acids, Bases and Salts	• Explain the importance of water of crystallization to some salts; Describe a test for water • Outline how a named soluble or insoluble salt is prepared.	Assignment page 154 – 157 questions 1, -4, 6,10,11,13, 16 – 17
4	Acids, Bases and Salts	• Define the terms deliquescence and efflorescence • Distinguish between hydrated and anhydrous salts • Perform Acid base titration • Perform REDOX titrations	Lab Acid base titrations REDOX titrations
5	Acids, Bases and Salts	• Review acids, bases and salts	**Test** on Acids, Bases and Salts

6	Rates of reactions	• Define 'rate of reaction • Fast and slow reactions • Endothermic and exothermic reactions • Factors affecting the rate of reactions • Reversible reactions/dynamic equilibrium	Assignment Blue Book: Page 200 Questions: 1.2,4,
7	Rates of reactions	• Explain the action of a catalyst using energy profile diagrams • Carry out the following experiments based on factors affecting rates of reactions o Formulate hypothesis o Design and conduct investigations to test hypotheses o Draw conclusions from the results of the investigations	Lab: Plan and design an experiment to investigate the effect of different catalysts on the rates of reactions
8	Rates of reactions	Review rates of reactions • Tell how the rate can be altered by changing: temperature; surface area; pressure; light and catalyst • Draw a graph to determine the rate of a chemical reaction	Test: Rates of reactions: Lab: the effect of concentration on reaction rates
9	Topic: Electrolysis	• What is electrolysis? • Classification of the elements and compounds as conductors and non-conductors or insulators • Current vs electrolysis • Half reactions	**assignment** CXC question on electrolysis
10	Faraday's Law	• Faraday's Law & calculations • Factors affecting discharge of ions • Electrochemical series	Lab: Effect of inert and active electrodes on the discharge of ions
11	electrolysis in industries	• Describe the process of o Electroplating o Electrorefining o Anodizing	
12	Electrolysis in industries	• Extraction of metals from their ores • Down's process • Flowing mercury cathode cell	Lab: 9A looking at what happens in electrolysis 9B electrolysis of copper sulphate solution: Electrolysis of concentrated and

			dilute NaCl
13	Electrolysis	• outline the function of the ○ dry cell ○ And they accumulator	Assignment: Draw and label diagrams of the dry cell and the accumulator and explain how they function. **Test** electrolysis