

Wah Yan College Kowloon
S.4 Chemistry Scheme of Work (2017-2018)

Textbook	<ol style="list-style-type: none"> 1. New 21st Century Chemistry 1C Topic 3 Metals (Compulsory Part) (2nd Edition) (WY) 2. New 21st Century Chemistry 2A Topic 4 Acids and Bases (Compulsory Part) (2nd Edition) (WY) 3. New 21st Century Chemistry 2B Topic 5 Redox Reactions, Chemical Cells and Electrolysis (Compulsory Part) (2nd Edition) (WY) 4. New 21st Century Chemistry 2C Topic 6 Microscopic World II (Compulsory Part) (2nd Edition) (WY)
Other Resources	

◆ **Repertoire of Self-directed Learning Skills:** reading to learn, notes-taking, looking up words in the dictionary, pre-lesson preparation, group discussion, group presentation, initiative to ask questions, setting learning objectives and doing reflection, eLearning platform with instant feedback, flipped classroom, peer assessment, searching for information on the internet, project learning, training of higher-order thinking skills

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
First Term (1/9/2017- 2/1/2018)		Topic 3 Metals					
		Unit 10 Occurrence and extraction of metals					
	1	10.1 Metals in our lives	◆ Uses of common metals in our lives	◆ PowerPoint ◆ Discussion	◆ Notes-taking	II	
	1	10.2 Uses of metals and their properties	◆ Relationship between the uses of metals and their properties	◆ PowerPoint	◆ Peer assessment	IV	◆ Practice 10.1
	1	10.3 Metals in the Earth's crust	◆ Abundance of metals in the Earth's crust	◆ PowerPoint	◆ Training of higher-order thinking skills	I,II,III	

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	1	10.4 Extracting metals from their ores	<ul style="list-style-type: none"> ◆ Heating the ore alone ◆ Reduction with carbon ◆ Electrolysis 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 10.1 — Extracting metals with carbon 	<ul style="list-style-type: none"> ◆ Notes-taking 	III, V	
	1	10.5 Year of discovery of metals and the ease of extraction	<ul style="list-style-type: none"> ◆ Relationship between year of discovery and extraction method of metals 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Peer assessment 	II	
	1	10.6 How long will metal reserves last?	<ul style="list-style-type: none"> ◆ An estimate of how long some metal reserves will last 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	I, II	
	1	10.7 The life cycle of metals	<ul style="list-style-type: none"> ◆ The life cycle of a metal article 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Peer assessment ◆ eLearning platform with instant feedback 	II	
	1	10.8 Recycling of metals	<ul style="list-style-type: none"> ◆ Importance of recycling ◆ Problems in 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Notes-taking 	IV	

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			recycling				
	1	10.9 Conservation of metal resources	◆ Methods of conservation — reuse, reduce, recycle and replace	◆ PowerPoint ◆ Discussion	◆ Training of higher-order thinking skills	I,II	◆ Unit exercise
		Unit 11 Reactivity of metals					
	2	11.1 Comparing the reactivity of metals	◆ Aspects to be considered when comparing the reactivity of metals	◆ PowerPoint ◆ Activity 11.1 — Comparing the reactivity of four unknown metals	◆ Notes-taking ◆ Reading to learn	II	
	2	11.2 How do metals react with oxygen in air?	◆ Reaction of metals with oxygen in air	◆ PowerPoint	◆ Peer assessment	III,V	
	2	11.3 How do metals react with cold water or steam?	◆ Reaction of metals with cold water or steam	◆ PowerPoint	◆ Setting learning objectives and doing reflection	III,V	
	2	11.4 How do metals react with dilute acids?	◆ Reaction of metals with dilute acids	◆ PowerPoint	◆ Peer assessment	I,II,III	

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	2	11.5 The reactivity series of metals	<ul style="list-style-type: none"> ◆ Arranging metals in a list according to their reactions with air, cold water, steam and dilute acids 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking ◆ eLearning platform with instant feedback 	III,V	<ul style="list-style-type: none"> ◆ Practice 11.1
	2	11.6 What is a chemical equation?	<ul style="list-style-type: none"> ◆ What a balanced chemical equation is ◆ What useful information can be obtained from a chemical equation 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	IV	
	2	11.7 How to write balanced chemical equations	<ul style="list-style-type: none"> ◆ Rules for writing balanced chemical equations 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking 	II	<ul style="list-style-type: none"> ◆ Practice 11.2
	2	11.8 What determines the reactivity of a metal?	<ul style="list-style-type: none"> ◆ Explaining the reactivity of a metal by how easily its atoms lose the outermost shell electrons ◆ Trends in the reactivity of metals in the periodic table 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	II	
	3	11.9	<ul style="list-style-type: none"> ◆ What displacement 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking 	I,II,III	

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		Displacement reactions	reactions are	<ul style="list-style-type: none"> ◆ Animations ◆ Activity 11.2 — Comparing the reactivity of metals by their displacement reactions 			
	3	11.10 Ionic equations	◆ Steps for writing ionic equations	◆ PowerPoint	<ul style="list-style-type: none"> ◆ Peer assessment ◆ eLearning platform with instant feedback 	III,V	◆ Practice 11.3
	3	11.11 Reactivity of metals and ease of extraction	◆ How metals at the top, in the middle and near to the bottom of the reactivity series are extracted	◆ PowerPoint	◆ Notes-taking	I,II	
	3	11.12 Prediction of metal reactions using the reactivity series*	<ul style="list-style-type: none"> ◆ Reactivity series and reduction of metal oxides ◆ Competition for oxygen between 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 11.3 — Extracting silver by 	◆ Setting learning objectives and doing reflection	IV	<ul style="list-style-type: none"> ◆ Practice 11.4 ◆ Unit exercise

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			metals	heating			
		Unit 12 Reacting masses					
	4	12.1 Calculating the amounts of substances	<ul style="list-style-type: none"> ◆ Why it is important to calculate the amount of substances in chemical reactions 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking 	II	
	4	12.2 Counting numbers by weighing	<ul style="list-style-type: none"> ◆ How chemists count atoms by weighing 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	III,V	
	4	12.3 What is a mole?	<ul style="list-style-type: none"> ◆ Definition ◆ The Avogadro constant ◆ Calculating the number of particles in a sample 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking 	I,II,III	<ul style="list-style-type: none"> ◆ Practice 12.1
	4	12.4 What is molar mass?	<ul style="list-style-type: none"> ◆ Definition ◆ Molar mass of a gaseous element ◆ Molar mass of a compound 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking ◆ Reading to learn 	III,V	<ul style="list-style-type: none"> ◆ Practice 12.2
	4	12.5 Calculations involving moles and masses	<ul style="list-style-type: none"> ◆ Converting mass to moles and moles to mass 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Setting learning objectives and 	I,II,III	<ul style="list-style-type: none"> ◆ Practice 12.3 ◆ Practice 12.4

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			<ul style="list-style-type: none"> ◆ Calculating the number of particles in a sample 		doing reflection		
	4	12.6 Percentage by mass of an element in a compound	<ul style="list-style-type: none"> ◆ Calculating the percentage by mass of an element in a compound ◆ Calculations involving water of crystallization 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking 	IV	<ul style="list-style-type: none"> ◆ Practice 12.5
	5	12.7 Determining the empirical formula of a compound	<ul style="list-style-type: none"> ◆ What empirical formula is ◆ Determining the empirical formulae of magnesium oxide and red copper oxide ◆ Working out an empirical formula using percentage composition ◆ Molecular and empirical formulae ◆ Working out the formula of a 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 12.1 — Determining the empirical formula of magnesium oxide 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	II	<ul style="list-style-type: none"> ◆ Practice 12.6 ◆ Practice 12.7

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			hydrated salt				
	5	12.8 Mole ratio in a balanced chemical equation	◆ Relationship between the coefficients in a chemical equation and the ratio of number of moles of reactant(s) and product(s)	◆ PowerPoint	◆ Setting learning objectives and doing reflection ◆ eLearning platform with instant feedback	II	
	5	12.9 Chemical equations and reacting masses	◆ Mass-mass calculations from chemical equations	◆ PowerPoint ◆ Discussion ◆ Animations ◆ Activity	◆ Notes-taking	II	◆ Practice 12.8 ◆ Practice 12.9
	5	12.10 Limiting reactant	◆ How to identify the limiting reactant in a chemical reaction	◆ PowerPoint ◆ Animations	◆ Peer assessment	II	◆ Practice 12.10
	5	12.11 Theoretical yield and percentage yield*	◆ Calculations involving theoretical yield, actual yield and percentage yield	◆ PowerPoint	◆ Setting learning objectives and doing reflection	I,II,III	◆ Practice 12.11 ◆ Unit exercise
		Unit 13 Corrosion of metals and their protection					

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	5	13.1 What is corrosion?	◆ What corrosion is	◆ PowerPoint	◆ Peer assessment	IV	
	5	13.2 Corrosion of iron: rusting	◆ Conditions necessary for rusting to occur ◆ What happens during rusting?	◆ PowerPoint ◆ Activity 13.1 — Investigating the necessary conditions for rusting	◆ Notes-taking	I,II	
	6	13.3 What factors can speed up the rusting process?	◆ Presence of ionic substances ◆ Presence of acidic pollutants ◆ Higher temperature ◆ Scratching or bending the surface ◆ Attachment to a less reactive metal	◆ PowerPoint ◆ Activity 13.2 — Investigating factors that influence the speed of rusting of iron	◆ Training of higher-order thinking skills ◆ Reading to learn	III,V	◆ Practice 13.1
	6	13.4 To observe rusting using a rust indicator	◆ Using potassium hexacyanoferrate(III) and phenolphthalein to observe rusting	◆ PowerPoint	◆ Setting learning objectives and doing reflection	IV	
	6	13.5 How to prevent rusting?	◆ Using protective coatings	◆ PowerPoint ◆ Activity	◆ Notes-taking	I,II,III	◆ Practice 13.2

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			<ul style="list-style-type: none"> ◆ Using sacrificial metals ◆ Impressed current cathodic protection ◆ Using corrosion resisting alloys of iron 	13.3 — Investigating the effectiveness of various ways to prevent rusting			
	6	13.6 Socioeconomic implications of rusting	<ul style="list-style-type: none"> ◆ The impact of rusting on our society and economy 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	III,V	
	6	13.7 What is the most suitable method to protect a particular iron article from rusting?	<ul style="list-style-type: none"> ◆ Factors to consider when choosing the most suitable method to protect an iron article from rusting 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	I,II,III	
	6	13.8 Corrosion resistance of aluminium*	<ul style="list-style-type: none"> ◆ The reason why aluminium is less reactive and more corrosion resistant than expected ◆ Aluminium anodization 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking 	III,V	<ul style="list-style-type: none"> ◆ Practice 13.3 ◆ Unit exercise ◆ Topic exercise ◆ Topic quiz

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		Topic 4 Acids and Base					
		Unit 14 Looking at acid and alkali					
	7	14.1 Acids in our daily lives	<ul style="list-style-type: none"> ◆ Acids commonly found in our daily lives 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking 	I,II	
	7	14.2 Acids in the laboratory	<ul style="list-style-type: none"> ◆ Acids commonly used in the laboratory ◆ Proper procedure in diluting concentrated sulphuric acid 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	IV	
	7	14.3 Characteristics of dilute acids	<ul style="list-style-type: none"> ◆ Taste ◆ Effect on indicators ◆ Reaction with metals ◆ Reaction with carbonates ◆ Reaction with hydrogen carbonates ◆ Reaction with 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 14.1 — Investigating the properties of dilute hydrochloric acid 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection ◆ eLearning platform with instant feedback 	I,II,III	<ul style="list-style-type: none"> ◆ Practice 14.1

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			hydroxides and oxides of metals ◆ Electrical conductivity				
	7	14.4 The role of water for acids	◆ Water must be present for an acid to show its acidic properties ◆ Definition of an acid ◆ Hydrogen ion in aqueous solution	◆ PowerPoint ◆ Animations ◆ Activity 14.2 — Comparing the properties of solid citric acid and its aqueous solution	◆ Notes-taking	III,V	◆ Practice 14.2
	7	14.5 Basicity of an acid	◆ What basicity of an acid means ◆ Basicity of some common acids	◆ PowerPoint	◆ Setting learning objectives and doing reflection	I,II,III	
	8	14.6 Bases and alkalis	◆ What bases and alkalis are	◆ PowerPoint	◆ Peer assessment ◆ Reading to learn	IV	
	8	14.7 Bases and alkalis in the	◆ Bases and alkalis commonly used in	◆ PowerPoint	◆ Training of higher-order	III,V	

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		home	our daily lives		thinking skills		
	8	14.8 Alkalis in the laboratory	◆ Alkalis commonly used in the laboratory	◆ PowerPoint	◆ Notes-taking	II	
	8	14.9 Characteristics of solutions of alkalis	<ul style="list-style-type: none"> ◆ Taste ◆ Feel ◆ Effect on indicators ◆ Reaction with metal ions ◆ Reaction with ammonium compounds ◆ Reaction with acid ◆ Electrical conductivity 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 14.3 — Investigating the properties of dilute solutions of alkalis 	◆ Peer assessment	II	
	8	14.10 The role of water for alkalis	◆ Properties of solutions of alkalis depend on the presence of hydroxide ions	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations 	<ul style="list-style-type: none"> ◆ Notes-taking ◆ eLearning platform with instant feedback 	I,II,III	
	8	14.11 An introduction to analytical chemistry*	<ul style="list-style-type: none"> ◆ Using the chemical reactions learnt to identify species in a sample ◆ Distinguish between 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	◆ Training of higher-order thinking skills	I,II	◆ Practice 14.3

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			chemicals				
	9	14.12 Concentrated acids	◆ Introduction to concentrated hydrochloric acid, nitric acid and sulphuric acid	◆ PowerPoint	◆ Setting learning objectives and doing reflection	IV	
	9	14.13 Corrosive nature of concentrated acids and alkalis	◆ How corrosive concentrated acids and alkalis are	◆ PowerPoint ◆ Discussion	◆ Notes-taking	III,V	
	9	14.14 Hygroscopic and deliquescent substances*	◆ Examples of hygroscopic and deliquescent substances ◆ Drying agents	◆ PowerPoint	◆ Training of higher-order thinking skills	I,II	◆ Unit exercise
		Unit 15 Molarity, pH scale and strengths of acid and alkalis					
	9	15.1 Concentration of a solution	◆ Calculations involving molarity	◆ PowerPoint	◆ Peer assessment	I,II,III	◆ Practice 15.1
	9	15.2 The pH scale	◆ Definition of pH ◆ Calculate concentration of	◆ PowerPoint	◆ Setting learning objectives and	I,II	◆ Practice 15.2

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			hydrogen ions from pH value and vice versa ◆ pH values of some common substances		doing reflection		
	10	15.3 Determining pH values of solutions	◆ Methods to determine pH values of solutions (universal indicator solution, pH meter and data-logger)	◆ PowerPoint ◆ Activity 15.1 — Classifying substances as acidic, alkaline or neutral using indicators	◆ Notes-taking	II	
	10	15.4 Strong and weak acids	◆ Definitions ◆ Comparing the dissociation of strong and weak acids in water	◆ PowerPoint ◆ Animations ◆ Activity 15.2 — Distinguishing between a strong acid and a weak acid	◆ Training of higher-order thinking skills	III,V	
	10	15.5 Comparing the strengths of acids	◆ Comparing the strength of acids by pH, electrical	◆ PowerPoint ◆ Discussion	◆ Setting learning objectives and	IV	

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			0conductivity and reaction with magnesium		doing reflection		
	10	15.6 Strong and weak alkalis	<ul style="list-style-type: none"> ◆ Definitions ◆ Comparing the dissociation of strong and weak alkalis in water 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations 	<ul style="list-style-type: none"> ◆ Peer assessment 	III,V	
	10	15.7 Comparing the strengths of alkalis	<ul style="list-style-type: none"> ◆ Comparing the strength of alkalis by pH and electrical conductivity 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking ◆ eLearning platform with instant feedback 	III,V	
	10	15.8 Strength versus concentration*	<ul style="list-style-type: none"> ◆ Distinguishing between the strength and concentration of acids 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	II	<ul style="list-style-type: none"> ◆ Practice 15.3 ◆ Unit exercise
		Unit 16 Salts and neutralization					
	11	16.1 Acid-base reactions	<ul style="list-style-type: none"> ◆ Neutralization of an acid and an alkali water sample ◆ Neutralization of an acid and an insoluble metal 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking ◆ Reading to learn 	II	<ul style="list-style-type: none"> ◆ Practice 16.1

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			hydroxide ◆ Neutralization of an acid and an insoluble metal oxide				
	11	16.2 Heat change during neutralization	◆ Heat released during the neutralization between a strong acid and a strong alkali	◆ PowerPoint	◆ Setting learning objectives and doing reflection	IV	
	11	16.3 Formation of salts	◆ Salt formation when hydrogen ions in acids are replaced by metal ions or ammonium ions ◆ Normal salts and acid salts	◆ PowerPoint	◆ Notes-taking	I,II	
	11	16.4 Naming of salts	◆ Rules for naming salts	◆ PowerPoint	◆ Training of higher-order thinking skills	III,V	◆ Practice 16.2
	11	16.5 Soluble and insoluble salts	◆ Solubility of some common salts in water	◆ PowerPoint	◆ Peer assessment	III,V	
	12	16.6 Preparing soluble salts	◆ Preparing copper(II) sulphate crystals	◆ PowerPoint ◆ Activity	◆ Notes-taking	IV	

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		(except sodium, potassium and ammonium salts)	<ul style="list-style-type: none"> ◆ Action of acids on metal / insoluble bases / insoluble carbonates ◆ Using the preparation of zinc sulphate as an example 	16.1 — Preparing magnesium sulphate crystals from the reaction between an acid and an insoluble carbonate			
	12	16.7 Preparing sodium, potassium and ammonium salts	<ul style="list-style-type: none"> ◆ Titration ◆ Action of acids on alkalis / soluble carbonates ◆ Using the preparation of sodium sulphate crystals as an example 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 16.2 — Preparing sodium chloride from an acid- alkali titration 	◆ Notes-taking	I,II,III	
	12	16.8 Preparing insoluble salts*	<ul style="list-style-type: none"> ◆ Preparing insoluble salts by precipitation reaction ◆ Using the preparation of 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 16.3 — Preparing silver chloride by 	◆ Setting learning objectives and doing reflection	III,V	◆ Practice 16.4

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			lead(II) chloride as an example	precipitation			
	12	16.9 Uses of neutralization	<ul style="list-style-type: none"> ◆ Soil treatment ◆ Treatment of industrial waste ◆ Production of fertilizers ◆ Treatment of an ache caused by excess acid in the stomach 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Notes-taking 	I,II,III	<ul style="list-style-type: none"> ◆ Practice 16.5 ◆ Unit exercise
	13	Revision Week					
	14-16	Mid-Year Examination					
	17-18	Christmas & New Year Holiday					
Second Term (3/1/2018-18/7/2018)		Topic 4 Acids and Base (Cont.)					
		Unit 17 Concentration of solutions and volumetric analysis					
	19	17.1 Concentration of a solution	<ul style="list-style-type: none"> ◆ Calculations involving concentration (in g dm⁻³) 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	III,V	<ul style="list-style-type: none"> ◆ Practice 17.1

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					<ul style="list-style-type: none"> ◆ eLearning platform with instant feedback 		
	19	17.2 Dilution	<ul style="list-style-type: none"> ◆ Calculations involving dilution 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Peer assessment 	I,II	<ul style="list-style-type: none"> ◆ Practice 17.2
	19	17.3 Volumetric analysis	<ul style="list-style-type: none"> ◆ What volumetric analysis is ◆ Apparatus used in volumetric analysis 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking 	IV	
	19	17.4 Preparing a standard solution of an acid / alkali	<ul style="list-style-type: none"> ◆ Dissolving a solid acid / alkali in water ◆ Diluting a concentrated acid / alkali of known concentration 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 17.1 — Preparing solutions of known concentrations 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills ◆ Reading to learn 	I,II	
	19	17.5 Acid-alkali titration	<ul style="list-style-type: none"> ◆ Steps in titration ◆ Using titration data to calculate the concentration of an unknown solution ◆ Washing apparatus in volumetric analysis 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	II,III,V	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
	19	17.6 pH change during a titration	<ul style="list-style-type: none"> ◆ What equivalence point is ◆ Monitoring the pH change during an acid- alkali titration using a pH meter ◆ Titration curve 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations ◆ Activity 17.2 — Following the pH change during an acid-alkali titration 	<ul style="list-style-type: none"> ◆ Notes-taking 	II,III,V	
	20	17.7 Using an indicator in an acid-alkali titration	<ul style="list-style-type: none"> ◆ Choosing a suitable indicator for an acid- alkali titration 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Peer assessment 	I,II,III	<ul style="list-style-type: none"> ◆ Practice 17.3
	20	17.8 Equivalence point detection by temperature change	<ul style="list-style-type: none"> ◆ Detecting the equivalence point of a titration by temperature change of the solution mixture 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	II,III,V	
	20	17.9 Steps to solve problems of acid- alkali titrations	<ul style="list-style-type: none"> ◆ Steps to solve problems involving acid-alkali titrations ◆ Calculations involving acid-alkali titrations 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 17.3 — Determining the concentration of citric acid in lemon squash 	<ul style="list-style-type: none"> ◆ Notes-taking 	IV	<ul style="list-style-type: none"> ◆ Practice 17.4 ◆ Practice 17.5

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
	20	17.10 Back titration*	<ul style="list-style-type: none"> ◆ Determining the percentage by mass of aluminium hydroxide in one drug tablet by back titration 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 17.5 — Determining the mass of the active ingredient in an antacid tablet 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	I,II,III	<ul style="list-style-type: none"> ◆ Unit exercise ◆ Topic exercise ◆ Topic quiz
		Topic 5 Redox Reactions, Chemical Cells and Electrolysis					
		Unit 18 Chemical cells in daily life					
	21	18.1 Electricity from chemical reactions	<ul style="list-style-type: none"> ◆ What a chemical cell is ◆ Magnesium-copper chemical cell 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	IV	
	21	18.2 Different types of chemical cells	<ul style="list-style-type: none"> ◆ Primary cells and secondary cells 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	II,III,V	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
	21	18.3 Terms related to chemical cells	<ul style="list-style-type: none"> ◆ Battery ◆ Negative and positive electrodes ◆ Electrolyte ◆ Capacity ◆ Discharge ◆ Service life, cycle life and shelf life 	◆ PowerPoint	◆ Notes-taking	I,II,III	
	21	18.4 Zinc-carbon cell	<ul style="list-style-type: none"> ◆ Zinc casing as the negative electrode ◆ Carbon rod as the positive electrode ◆ Ammonium chloride as the electrolyte 	◆ PowerPoint	<ul style="list-style-type: none"> ◆ Peer assessment ◆ eLearning platform with instant feedback 	II,III,V	
	22	18.5 Alkaline manganese cell	<ul style="list-style-type: none"> ◆ Zinc as the negative electrode ◆ Manganese(IV) oxide as the positive electrode ◆ Potassium hydroxide as the electrolyte 	◆ PowerPoint	<ul style="list-style-type: none"> ◆ Notes-taking ◆ Reading to learn 	I,II,III	
	22	18.6 Silver oxide cell	◆ Zinc as the negative electrode	◆ PowerPoint	◆ Setting learning	IV	

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			<ul style="list-style-type: none"> ◆ Silver oxide as the positive electrode ◆ Potassium hydroxide as the electrolyte 		objectives and doing reflection		
	22	18.7 Lithium ion cell	<ul style="list-style-type: none"> ◆ Lithium atoms lying between graphite sheets as the negative electrode ◆ Lithium metal oxide as the positive electrode ◆ Lithium salt as the electrolyte 	◆ PowerPoint	◆ Notes-taking	I,II,III	
	22	18.8 Nickel metal hydride (NiMH) cell	<ul style="list-style-type: none"> ◆ Hydrogen absorbing alloys as the negative electrode ◆ Nickel(II) hydroxide as the positive electrode ◆ Potassium hydroxide as the electrolyte 	◆ PowerPoint	◆ Training of higher-order thinking skills	7	
	23	18.9 Lead-acid accumulator*	<ul style="list-style-type: none"> ◆ Lead plates as the negative electrode 	◆ PowerPoint	◆ Notes-taking	I,II	

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			<ul style="list-style-type: none"> ◆ Lead plates coated with lead(IV) oxide as the positive electrode ◆ Sulphuric acid as the electrolyte 				
	23	18.10 Choosing a chemical cell for a particular use	<ul style="list-style-type: none"> ◆ Aspects to consider when choosing a chemical cell for a particular use 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Notes-taking 	I,II	
	23	18.11 Environmental impact of using chemical cells	<ul style="list-style-type: none"> ◆ Heavy metal components of chemical cells are toxic ◆ Advantages of using secondary cells 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	I,II,III	<ul style="list-style-type: none"> ◆ Unit exercise
	24-25	Lunar New Year Holiday					
		Unit 19 Simple chemical cells					
	26	19.1 Reactions in simple chemical cells	<ul style="list-style-type: none"> ◆ How electrons flow in the external circuit of a simple chemical cell ◆ Ionic half-equation 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 19.1 – Building simple chemical cells 	<ul style="list-style-type: none"> ◆ Taining of higher-order thinking skills 	II,III,V	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
	26	19.2 Lemon cells made from different metal couples	<ul style="list-style-type: none"> ◆ Measuring the voltages of lemon cells formed when coupling other metals with copper ◆ Comparing the tendency of metals to form ions based on voltages of the lemon cells 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Notes-taking ◆ Reading to learn 	IV	
	26	19.3 The electrochemical series of metals	<ul style="list-style-type: none"> ◆ Introducing the electrochemical series of metal ◆ Comparing the electrochemical series with the reactivity series 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Peer assessment 	II,III,V	◆ Practice 19.1
	26	19.4 Improving simple chemical cells	<ul style="list-style-type: none"> ◆ Separating a simple chemical cell into two half-cells 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations 	<ul style="list-style-type: none"> ◆ Notes-taking 	IV	
	26	19.5 The role of a salt bridge	<ul style="list-style-type: none"> ◆ Functions of a salt bridge 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 19.2 – Building a chemical cell with the 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	I,II,III	◆ Practice 19.2

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
				maximum voltage using given materials and equipment			
	26	19.6 The Daniell cell*	<ul style="list-style-type: none"> ◆ Structure of a Daniell cell ◆ Reactions occurring in a Daniell cell 	◆ PowerPoint	◆ Training of higher-order thinking skills	II,III,V	◆ Unit exercise
		Unit 20 Oxidation and reduction					
	26	20.1 Defining oxidation and reduction in terms of gain and loss of oxygen	◆ Describing oxidation and reduction in terms of gain and loss of oxygen	◆ PowerPoint	◆ Notes-taking	II,III,V	
	26	20.2 Defining oxidation and reduction in terms of gain and loss of hydrogen	◆ Describing oxidation and reduction in terms of gain and loss of hydrogen	◆ PowerPoint	◆ Setting learning objectives and doing reflection	I,II	
	26	20.3 Defining oxidation and reduction in terms of gain and loss of electrons	◆ Describing oxidation and reduction in terms of gain and loss of	◆ PowerPoint	◆ Peer assessment	IV	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
			electrons				
	26	20.4 Oxidizing agent and reducing agent	◆ Introducing oxidizing agent and reducing agent	◆ PowerPoint	◆ Notes-taking ◆ eLearning platform with instant feedback	I,II,III	
	26	20.5 Relative strength of reducing and oxidizing agents	◆ The trend of reducing power of metals in the electrochemical series ◆ The trend of oxidizing power of metal ions in the electrochemical series	◆ PowerPoint	◆ Peer assessment	I,II	◆ Practice 20.1
	27	20.6 Oxidation numbers	◆ The concept of oxidation number ◆ Rules for assigning oxidation numbers to elements in different species	◆ PowerPoint	◆ Notes-taking	I,II	◆ Practice 20.2
	27	20.7 Defining oxidation and reduction in terms of	◆ Using changes in oxidation number to identify redox	◆ PowerPoint	◆ Training of higher-order thinking skills	II,III,V	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
		changes in oxidation numbers	reactions				
	27	20.8 Using oxidation numbers to identify the oxidizing agent and reducing agent in a redox reaction	◆ Using changes in oxidation number to identify the oxidizing agent and reducing agent in a redox reaction	◆ PowerPoint	◆ Setting learning objectives and doing reflection	IV	◆ Practice 20.3
	27	20.9 Advantages and disadvantages of using the concept of oxidation number	◆ Advantages and disadvantages of using the oxidation number concept	◆ PowerPoint	◆ Notes-taking	II,III,V	
	27	20.10 The Stock system of naming compounds*	◆ Naming cations ◆ Naming polyatomic anions	◆ PowerPoint	◆ Peer assessment ◆ Reading to learn	I,II,III	
	27	20.11 Common oxidizing and reducing agents	◆ Chemical changes of common oxidizing and reducing agents ◆ Ionic half-equations representing the chemical changes	◆ PowerPoint ◆ Activity 20.1 – Investigating redox reactions	◆ Setting learning objectives and doing reflection	II,III,V	◆ Practice 20.4
	27	20.12	◆ How to balance	◆ PowerPoint	◆ Notes-taking	I,II,III	◆

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
		Balancing redox equations using ionic half-equations	redox equations using ionic half-equations				
	27	20.13 Balancing redox equations using oxidation number method	<ul style="list-style-type: none"> ◆ How to balance redox equations using oxidation number method 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Peer assessment 	II,III,V	<ul style="list-style-type: none"> ◆ Practice 20.5
	28	20.14 The electrochemical series and the relative oxidizing / reducing power of common oxidizing / reducing agents	<ul style="list-style-type: none"> ◆ Introducing a detailed version of the electrochemical series ◆ Predicting the feasibility of a redox reaction using the electrochemical series 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	I,II	
	28	20.15 Chlorine as an oxidizing agent	<ul style="list-style-type: none"> ◆ Action of aqueous chlorine on potassium bromide solution ◆ Action of aqueous chlorine on potassium iodide solution ◆ Reaction with 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 20.2 – Investigating redox reactions of aqueous chlorine 	<ul style="list-style-type: none"> ◆ Notes-taking 	I,II,III	<ul style="list-style-type: none"> ◆ Practice 20.6

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
			sodium hydroxide solution				
	28	20.16 Nitric acid of different concentrations as oxidizing agents	<ul style="list-style-type: none"> ◆ Oxidizing property of concentrated and dilute nitric acids 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 0.3 – Investigating the action of nitric acid of different concentrations on metals 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	IV	<ul style="list-style-type: none"> ◆ Practice 20.7
	28	20.17 Concentrated sulphuric acid as an oxidizing agent	<ul style="list-style-type: none"> ◆ Action of concentrated sulphuric acid on metals ◆ Action of concentrated sulphuric acid on non-metals ◆ Action of concentrated sulphuric acid on halides 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 20.4 – Investigating the action of dilute and concentrated sulphuric acid on metals 	<ul style="list-style-type: none"> ◆ Notes-taking 	I,II	<ul style="list-style-type: none"> ◆ Practice 20.8
	28	20.18 Aqueous sulphur dioxide as a reducing agent	<ul style="list-style-type: none"> ◆ Action of aqueous sulphur dioxide on some common 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Setting learning objectives and 	IV	<ul style="list-style-type: none"> ◆ Practice 20.9 ◆ Unit exercise

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
			oxidizing agents ◆ Test for sulphur dioxide gas		doing reflection		
	29	Uniform Test					
	30-31	Easter Holiday					
		Unit 21 Oxidation and reduction in chemical cells					
	32	21.1 Oxidation and reduction in a simple chemical cell	◆ Reactions occurring at the electrodes of a chemical cell	◆ PowerPoint	◆ Notes-taking	I,II,III	◆ Practice 21.1
	33	21.2 Redox reactions in a zinc-carbon cell	◆ Redox reactions in a zinc-carbon cell ◆ Two main disadvantages of the cell	◆ PowerPoint	◆ Training of higher-order thinking skills ◆ eLearning platform with instant feedback	II	
	33	21.3 Redox reactions in simple chemical cells with inert electrodes	◆ Redox reactions in simple chemical cells set up using – acidified $\text{KMnO}_4(\text{aq})$ and $\text{FeSO}_4(\text{aq})$	◆ PowerPoint	◆ Setting learning objectives and doing reflection	II,III,V	◆ Practice 21.2

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
			– KI(aq) and Fe ₂ (SO ₄) ₃ (aq)				
	33	21.4 Fuel cells*	<ul style="list-style-type: none"> ◆ How a fuel cell works ◆ Major types of fuel cell ◆ Direct methanol fuel cells 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion ◆ Animations 	<ul style="list-style-type: none"> ◆ Peer assessment ◆ Reading to learn 	I,II	◆ Unit exercise
		Unit 22 Electrolysis					
	33	22.1 Electrolysis: chemical reactions from electricity	◆ Terms commonly used in electrolysis	◆ PowerPoint	◆ Notes-taking	II,III,V	
	34	22.2 Comparing a chemical cell and an electrolytic cell	<ul style="list-style-type: none"> ◆ Function ◆ Direction of electron flow ◆ Reactions at electrodes 	◆ PowerPoint	◆ Peer assessment	IV	
	34	22.3 Electrolysis of molten sodium chloride using carbon electrodes	◆ Illustrating the chemical changes brought out by electricity using electrolysis of molten sodium chloride as an	◆ PowerPoint	◆ Training of higher-order thinking skills	II	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
			example				
	34	22.4 Some knowledge related to aqueous electrolytes	<ul style="list-style-type: none"> ◆ Dissociation of water ◆ Dissociation of acids in water ◆ Dissolving electrolytes in water 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	I,II	
	34	22.5 Electrolysis of aqueous solutions of ionic compounds	<ul style="list-style-type: none"> ◆ Electrolysis of acidified water using platinum electrodes ◆ Electrolysis of very dilute sodium chloride solution using carbon electrodes 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations ◆ Activity 22.1 – Investigating the electrolysis of acidified water 	<ul style="list-style-type: none"> ◆ Notes-taking 	I,II,III	<ul style="list-style-type: none"> ◆ Practice 22.1
	34	22.6 Factors affecting the order of discharge of ions during the electrolysis of aqueous solutions	<ul style="list-style-type: none"> ◆ The position of ions in the electrochemical series ◆ The effect of concentration of ions in the solution ◆ The nature of the electrodes 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Peer assessment 	II	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
	35	22.7 The position of ions in the electrochemical series and the order of discharge of ions*	<ul style="list-style-type: none"> ◆ Order of discharge of cations ◆ Order of discharge of anions 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Activity 22.2 – Investigating factors affecting the order of discharge of ions during electrolysis – position of ions in the electrochemical series 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills ◆ Reading to learn 	II,III,V	
	35	22.8 The effect of concentration of ions in the solution and the order of discharge of ions	<ul style="list-style-type: none"> ◆ Electrolysis of dilute or concentrated sodium chloride solution using carbon electrodes 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations ◆ Activity 22.3 – Investigating factors affecting the order of discharge of ions during electrolysis – effect of concentration 	<ul style="list-style-type: none"> ◆ Notes-taking 	IV	<ul style="list-style-type: none"> ◆ Practice 22.2

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
				of ions in the solution			
	35	22.9 The nature of electrodes and the order of discharge of ions	<ul style="list-style-type: none"> ◆ Electrolysis of dilute copper(II) sulphate solution using carbon electrodes ◆ Electrolysis of dilute copper(II) sulphate solution using copper electrodes ◆ Electrolysis of concentrated sodium chloride solution using a mercury cathode 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations ◆ Activity 22.4 – Investigating factors affecting the order of discharge of ions during electrolysis – effect of the nature of electrodes 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	I,II,III	<ul style="list-style-type: none"> ◆ Practice 22.3 ◆ Practice 22.4
	35	22.10 Industrial uses of electrolysis*	<ul style="list-style-type: none"> ◆ Refining of copper ◆ Electroplating 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations ◆ Activity 22.5 – Electroplating with nickel 	<ul style="list-style-type: none"> ◆ Notes-taking ◆ eLearning platform with instant feedback 	I,II,III	<ul style="list-style-type: none"> ◆ Practice 22.5
	36	22.11 Environmental impact of the electroplating	<ul style="list-style-type: none"> ◆ Pollutions due to acids, alkalis, compounds of 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Peer assessment 	I,II	<ul style="list-style-type: none"> ◆ Unit exercise ◆ Topic exercise

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
		industry	heavy metals and cyanides ◆ Methods to control pollution from the electroplating industry				◆ Topic quiz
		Topic 6 Microscopic World II					
		Unit 23 Shapes of molecules					
	36	23.1 Covalent molecules with non-octet structures	◆ BF ₃ molecule ◆ PCl ₅ molecule ◆ SF ₆ molecule	◆ PowerPoint	◆ Training of higher-order thinking skills	I,II	◆ Practice 23.1
	36	23.2 Shapes of molecules of methane, ammonia and water	◆ Shapes of CH ₄ molecule, NH ₃ molecule and H ₂ O molecule ◆ Predicting the shapes of molecules using the valence-shell electron-pair repulsion (VSEPR) theory	◆ PowerPoint	◆ Notes-taking	II	◆ Practice 23.2
	36	23.3	◆ Shapes of the	◆ PowerPoint	◆ Setting	IV	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
		Shapes of some other molecules	following molecules – BeCl ₂ – BF ₃ – PCl ₅ – SF ₆	◆ Activity 23.1 – Building models of molecules	learning objectives and doing reflection ◆ Reading to learn		
	36	23.4 Shapes of molecules with multiple bonds	◆ Shapes of CO ₂ and C ₂ H ₄ molecules ◆ Predicting the bond angles in the structure of a compound	◆ PowerPoint	◆ Peer assessment	II	◆ Practice 23.3
	36	23.5 Molecular crystals of buckminsterfullerene (C ₆₀)*	◆ Structure of buckminsterfullerene ◆ Properties of buckminsterfullerene ◆ Applications of fullerenes	◆ PowerPoint ◆ Discussion ◆ Activity 23.2 – Building a paper model of a C ₆₀ molecule	◆ Notes-taking	II,III,V	◆ Practice 23.4 ◆ Unit exercise
		Unit 24 Bond polarity and intermolecular forces					
	36	24.1 Electron sharing in a	◆ Polar covalent bond ◆ Uneven distribution	◆ PowerPoint ◆ Discussion	◆ Setting learning	I,II,III	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
		covalent bond	of bonding electrons in a HCl molecule		objectives and doing reflection		
	36	24.2 Electronegativity	<ul style="list-style-type: none"> ◆ What electronegativity is ◆ Electronegativity of some common elements 	<ul style="list-style-type: none"> ◆ PowerPoint 	<ul style="list-style-type: none"> ◆ Peer assessment 	IV	◆ Checkpoint
	37	24.3 How polar bonds and shape affect the polarity of a molecule	<ul style="list-style-type: none"> ◆ Dipole moment ◆ Polar molecules <ul style="list-style-type: none"> – H₂O – NH₃ – CHCl₃ ◆ Non-polar molecules <ul style="list-style-type: none"> – CO₂ – BF₃ – CCl₄ 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion ◆ Animations 	<ul style="list-style-type: none"> ◆ Notes-taking 	I,II	
	37	24.4 Effect of a charged rod on polar and non-polar liquids	<ul style="list-style-type: none"> ◆ Using a charged rod to test whether molecules of a liquid are polar 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion ◆ Activity 24.1 — ◆ Testing liquids to find out if their molecules 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills 	I,II,III	◆ Checkpoint

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
				are polar			
	37	24.5 Intermolecular forces	<ul style="list-style-type: none"> ◆ Permanent dipole permanent dipole attractions ◆ Instantaneous dipole induced dipole attractions ◆ Van der Waals' forces 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations 	<ul style="list-style-type: none"> ◆ Setting learning objectives and doing reflection 	I,II	◆ Checkpoint
	37	24.6 Factors affecting the strength of van der Waals' forces	<ul style="list-style-type: none"> ◆ Number of electrons in the atom or molecule ◆ Shape of the molecule 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion ◆ Animations 	<ul style="list-style-type: none"> ◆ Peer assessment 	II	◆ Checkpoint
	37	24.7 Hydrogen bonding	<ul style="list-style-type: none"> ◆ Special features of hydrogen bonding ◆ Hydrogen bonding in <ul style="list-style-type: none"> – liquid hydrogen fluoride – water – liquid ammonia – methanol 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Animations 	<ul style="list-style-type: none"> ◆ Training of higher-order thinking skills ◆ eLearning platform with instant feedback 	I,II,III	◆ Checkpoint
	38	24.8 The density of water and	<ul style="list-style-type: none"> ◆ The open structure of ice due to 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion 	<ul style="list-style-type: none"> ◆ Notes-taking 	II	

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
		ice	<p>hydrogen bonding</p> <ul style="list-style-type: none"> ◆ Explaining why ice is less dense than water in terms of the structure of ice 				
	38	24.9 Surface tension and viscosity of liquids*	<ul style="list-style-type: none"> ◆ Explaining the high surface tension of water in terms of hydrogen bonding ◆ Factors affecting the viscosity of a liquid 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion ◆ Activity 24.2 — Investigating the surface tension and viscosity of water 	<ul style="list-style-type: none"> ◆ Peer assessment 	IV	
	38	24.10 Intermolecular attractions in Alcohols*	<ul style="list-style-type: none"> ◆ Comparing the boiling points of ethanol, methoxymethane and propane ◆ Comparing the water solubility of ethanol, methoxymethane and propane ◆ Comparing the 	<ul style="list-style-type: none"> ◆ PowerPoint ◆ Discussion ◆ Activity 24.3 — Comparing the viscosity of alcohols with different numbers of hydroxyl groups 	<ul style="list-style-type: none"> ◆ Notes-taking ◆ Reading to learn 	II	<ul style="list-style-type: none"> ◆ Checkpoint

School Term	Weeks/ Dates	Topics/ Extended Parts*	Learning Objectives/ Teaching Focus	Teaching and Learning Activities	Self-directed Learning Skills*	Values#/ Basic Law Education	Consolidation and Assessment
			viscosity of different alcohols				
	38	24.11 Intermolecular attractions and properties of liquids*	◆ The evaporation rate of liquids with different strength of intermolecular attractions	◆ PowerPoint ◆ Animations ◆ Activity 24.4 — Investigating the temperature changes caused by the evaporation of liquids with different strength of intermolecular attractions	◆ Setting learning objectives and doing reflection	II	◆ Unit exercise ◆ Topic exercise ◆ Topic quiz
	39	Revision Week					
	40-42	Final Examination					

* The extended parts should be marked with asterisks. These parts should be more challenging and can be covered when the students can master the knowledge and skills covered in the conventional topics.

Core Values of Wah Yan College, Kowloon

I. Love and care

II. Strive for excellence

III. Respect and Justice

IV. Responsibility

V. Faith

Sustaining values

	Life	Family	Love	Justice	Truth
I. Love and care	1. Accept & feel positive about himself 2. Appreciation & Gratitude 3. Empathy & Compassion 4. Positive and grateful 5. Kind and humble	6. Love your family 7. Loyalty and fidelity 8. Family as a basic unit of society; marriage is the foundation of a family	9. Forgiveness & Reconciliation 10. Care for the poor and the needy 11. Service to others		
II. Strive for excellence	12. Reflective 13. Strive for excellence (Magis & fighting spirit), 14. Reflection (Examen), 15. Discern right from wrong (Ignatian Spirituality), 16. Men of Human Excellence (Competence, Commitment, Compassion, Conscience) 17. Perseverance 18. Curiosity & willingness to learn 19. Value imagination and				

	creativity				
III. Respect and Justice	20. Life is valuable and respectable 21. Manners and etiquette 22. Openness to good in all things 23. Honesty and integrity 24. Faithfulness	25. Mutual respect between a man and a woman	26. Love your neighbours 27. Respect for himself & others	28. Respect the rights of others, equity, the common good, human dignity	
IV. Responsibility	29. Freedom & Self-discipline 30. Responsible with public property 31. Responsibility		32. Care for the environment	33. Social Identities: citizen identity, national identity and global citizen identity	
V. Faith					34. Appreciate religious liturgies 35. Explore & practise one's faith 36. Sacrifice 37. Experience of God 38. The meaning of life 39. Truth about God, 40. Evangelization