

Wah Yan College Kowloon
F.5 Chemistry Scheme of Work (2017-2018)

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| Textbook | <ol style="list-style-type: none"> 1. New 21st Century Chemistry 2C Topic 6 Microscopic World II (Compulsory Part) (2nd Edition) (WY) 2. New 21st Century Chemistry 3A Topic 7 Fossil Fuels and Carbon Compounds (Compulsory Part) (2nd Edition) (WY) 3. New 21st Century Chemistry 3B Topic 8 Chemistry of Carbon Compounds (Compulsory Part) (2nd Edition) (WY) 4. New 21st Century Chemistry 3C Topic 9 Chemical Reactions and Energy (Compulsory Part) (2nd Edition) (WY) 5. New 21st Century Chemistry 4A Topic 10 Rate of Reaction (Compulsory Part) (2nd Edition) (WY) 6. New 21st Century Chemistry 4B Topic 11 Chemical Equilibrium (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 | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
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| First Term (1/9/2017- 2/1/2018) | | Topic 6 Microscopic World II - Bond polarity and intermolecular forces | | | | | |
| | Week 1 | 24.1 Electron sharing in a covalent bond | <ul style="list-style-type: none"> • Polar covalent bond • Uneven distribution of bonding electrons in a HCl molecule | <ul style="list-style-type: none"> • PowerPoint • Discussion | Setting learning objectives and doing reflection | 7,10 | |
| | Week 1 | 24.2 Electronegativity | <ul style="list-style-type: none"> • What electronegativity is • Electronegativity of some common elements | <ul style="list-style-type: none"> • PowerPoint | | 7 | • Checkpoint |
| | Week 1 | 24.3 How polar bonds and | <ul style="list-style-type: none"> • Dipole moment • Polar molecules | <ul style="list-style-type: none"> • PowerPoint • Discussion | Training of higher-order | 7,10 | |

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| | | shape affect the polarity of a molecule | <ul style="list-style-type: none"> – H₂O – NH₃ – CHCl₃ • Non-polar molecules – CO₂ – BF₃ – CCl₄ | <ul style="list-style-type: none"> • Animations | thinking skills | | |
| | Week 1 | 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 are polar | | 7 | <ul style="list-style-type: none"> • Checkpoint |
| | Week 1 | 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 | Notes-taking Reading to learn | 7,10 | <ul style="list-style-type: none"> • Checkpoint |
| | Week 1 | 24.6 | <ul style="list-style-type: none"> • Number of electrons in | <ul style="list-style-type: none"> • PowerPoint | | 7,10 | <ul style="list-style-type: none"> • Checkpoint |

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| | | Factors affecting the strength of van der Waals' forces | <ul style="list-style-type: none"> the atom or molecule • Shape of the molecule | <ul style="list-style-type: none"> • Discussion • Animations | | | |
| | Week 2 | 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 | | 2,7,10 | • Checkpoint |
| | Week 2 | 24.8 The density of water and ice | <ul style="list-style-type: none"> • The open structure of ice due to hydrogen bonding • Explaining why ice is less dense than water in terms of the structure of ice | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 2,10 | |
| | Week 2 | 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 | | 2,7,10 | |

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| | | | | viscosity of water | | | |
| | Week 2 | 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 viscosity of different alcohols | <ul style="list-style-type: none"> • PowerPoint • Discussion • Activity 24.3 — Comparing the viscosity of alcohols with different numbers of hydroxyl groups | Notes-taking Reading to learn | 7,10 | • Checkpoint |
| | Week 2 | 24.11 * Intermolecular attractions and properties of liquids | <ul style="list-style-type: none"> • The evaporation rate of liquids with different strength of intermolecular attractions | <ul style="list-style-type: none"> • PowerPoint • Animations • Activity 24.4 — Investigating the temperature changes caused by the evaporation of liquids with different strength of intermolecular | | 7,10 | <ul style="list-style-type: none"> • Unit exercise • Topic exercise • Topic quiz |

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| | | | | attractions • Concept mapping | | | |
| | | Topic 7 Fossil fuels | | | | | |
| | Week 3 | 25.1 Fossil fuels — A major energy source | • Formation of coal • Formation of petroleum and natural gas | • PowerPoint • Discussion | Setting learning objectives and doing reflection | 2,10,18 | |
| | Week 3 | 25.2 Importance of petroleum | • Main uses of refined petroleum • Economic importance of petroleum | • PowerPoint • Discussion | | 2,10,18 | |
| | Week 3 | 25.3 Hydrocarbons | • Definition • Types of hydrocarbons | • PowerPoint | | 2,10 | |
| | Week 3 | 25.4 What does petroleum contain? | • Hydrocarbons in petroleum – alkanes – cycloalkanes – aromatic hydrocarbons | • PowerPoint | Notes-taking Reading to learn | 2,10 | |
| | Week 3 | 25.5 Fractional distillation of petroleum | • How fractional distillation of petroleum is carried out in an oil | • Activity 25.1 — Fractional distillation | | 2,10,18 | |

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| | | | refinery <ul style="list-style-type: none"> Fractional distillation of crude oil in the laboratory Properties of fractions of petroleum with different boiling point ranges | of crude oil and studying the properties of its fractions <ul style="list-style-type: none"> PowerPoint Discussion 3D animations | | | |
| | Week 3 | 25.6 Major uses of fractions of Petroleum | <ul style="list-style-type: none"> Major uses of fractions of petroleum | <ul style="list-style-type: none"> PowerPoint Discussion | | 7,10,18 | <ul style="list-style-type: none"> Practice 25.1 |
| | Week 4 | 25.7 Combustion of hydrocarbons | <ul style="list-style-type: none"> Exothermic and endothermic reactions | <ul style="list-style-type: none"> PowerPoint | | 2,10 | |
| | Week 4 | 25.8 Carbon dioxide and the greenhouse effect | <ul style="list-style-type: none"> What the greenhouse effect is How carbon dioxide causes the greenhouse effect | <ul style="list-style-type: none"> PowerPoint Discussion | | 7,10,18 | <ul style="list-style-type: none"> Practice 25.2 |
| | Week 4 | 25.9 Major air pollutants from cars, factories, incinerators and | <ul style="list-style-type: none"> Carbon monoxide Unburnt hydrocarbons Suspended particulates Oxides of nitrogen | <ul style="list-style-type: none"> PowerPoint Discussion Animations | | 2,10,18 | |

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| | | power plants | <ul style="list-style-type: none"> • Sulphur dioxide • Effects of the air pollutants to the environment and human health | | | | |
| | Week 4 | 25.10 Measures for reducing emission of air pollutants | <ul style="list-style-type: none"> • Air pollution in Hong Kong • Using catalytic converters in exhaust systems of motor vehicles | <ul style="list-style-type: none"> • PowerPoint • Discussion • Animations | | 7,10,18 | • Practice 25.3 |
| | Week 4 | 25.11 Impact of using fossil fuels on our quality of life and the environment | <ul style="list-style-type: none"> • How modern people use fossil fuels • Impact of using fossil fuels on the environment | <ul style="list-style-type: none"> • PowerPoint • Discussion • Animations • Concept mapping | Notes-taking Reading to learn | 2,7,18 | • Unit exercise |
| | | Unit 26 Homologous series, structural formulae and naming of carbon compounds | | | | 2,10 | |
| | Week 5 | 26.1 A look at molecules of compounds in petroleum | <ul style="list-style-type: none"> • Boiling points of hydrocarbons in petroleum | <ul style="list-style-type: none"> • PowerPoint • Discussion | Setting learning objectives and doing | 2,10 | |

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| | | | | | reflection | | |
| | Week 5 | 26.2 Chemistry of carbon compounds | <ul style="list-style-type: none"> • Unique features of carbon | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 2,10 | |
| | Week 5 | 26.3 Representing molecules of carbon compounds | <ul style="list-style-type: none"> • Structural formulae • Condensed structural formulae • Skeletal formulae | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 2,7,10 | <ul style="list-style-type: none"> • Practice 26.1 |
| | Week 5 | 26.4 Molecular models | <ul style="list-style-type: none"> • Ball-and-stick models • Space-filling models | <ul style="list-style-type: none"> • PowerPoint • Animations | | 2,10 | |
| | Week 5 | 26.5 Functional groups | <ul style="list-style-type: none"> • What a functional group is | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 2,10 | |
| | Week 5 | 26.6 Homologous series | <ul style="list-style-type: none"> • What a homologous series is • Characteristics of members in a homologous series • Some homologous series and the functional groups they contain | <ul style="list-style-type: none"> • Activity 26.1 — Building molecular models of alkanols and alkanolic acids • PowerPoint • Discussion | | 2,10 | |
| | Week 6 | 26.7 The alkanes | <ul style="list-style-type: none"> • General formula of members of the alkane series | <ul style="list-style-type: none"> • Activity 26.2 — Building molecular models | | 2,10 | |

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| | | | <ul style="list-style-type: none"> • Six simple straight-chain alkanes | of alkanes <ul style="list-style-type: none"> • PowerPoint | | | |
| | Week 6 | 26.8 Naming straight chain and branched chain alkanes | <ul style="list-style-type: none"> • Naming <ul style="list-style-type: none"> – straight-chain alkanes – branched-chain alkanes – cycloalkanes | <ul style="list-style-type: none"> • PowerPoint | | 2,7,10 | <ul style="list-style-type: none"> • Practice 26.2 |
| | Week 6 | 26.9 Naming alkenes | <ul style="list-style-type: none"> • Naming alkenes with carbon chains containing up to 6 carbon atoms | <ul style="list-style-type: none"> • Activity 26.3 — Building molecular models of alkenes • PowerPoint | | 2,7,10 | <ul style="list-style-type: none"> • Practice 26.3 |
| | Week 6 | 26.10 Naming alkanols | <ul style="list-style-type: none"> • Naming alkanols with carbon chains containing up to 6 carbon atoms | <ul style="list-style-type: none"> • PowerPoint | | 2,10 | |
| | Week 6 | 26.11 Naming alkanolic acids | <ul style="list-style-type: none"> • Naming alkanolic acids with carbon chains containing up to 6 carbon atoms | <ul style="list-style-type: none"> • PowerPoint | | 2,7,10 | <ul style="list-style-type: none"> • Practice 26.4 |
| | Week 6 | 26.12 | <ul style="list-style-type: none"> • Rise of melting and | <ul style="list-style-type: none"> • PowerPoint | | 2,7,10 | <ul style="list-style-type: none"> • Unit exercise |

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| | | Physical properties of alkanes | boiling points of alkanes with the increase of the number of carbon atoms in the alkane molecules • Solubility and density of alkanes | • Discussion • Concept mapping | | | |
| | | Unit 27 Alkanes and alkenes | | | | | |
| | Week 7 | 27.1 Risks and benefits of fossil fuels to the society and Environment | • Benefits of using fossil fuels • Risks of using fossil fuels • Spillage of petroleum | • PowerPoint • Discussion | Setting learning objectives and doing reflection | 2,10,18 | |
| | Week 7 | 27.2 Important reactions of alkanes | • Combustion • Reaction with halogens — substitution reactions • Steps involved in the substitution of methane with chlorine | • Activity 27.1 — Investigating the properties of an alkane • PowerPoint • Discussion | | 2,7,10 | • Practice 27.1 |
| | Week 7 | 27.3 Demand for various fractions of Petroleum | • Percentages of various fractions obtained from the fractional distillation | • PowerPoint | Notes-taking Reading to learn | 2,10,18 | |

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| | | | <p>of petroleum from different parts of the world</p> <ul style="list-style-type: none"> • The supply and demand for various fractions | | | | |
| | Week 8 | 27.4 Cracking | <ul style="list-style-type: none"> • Catalytic cracking • Cracking of tetradecane as an example • Importance of cracking <ul style="list-style-type: none"> – Producing extra petrol – As a source of alkenes • Cracking of medicinal paraffin in the laboratory | <ul style="list-style-type: none"> • Activity 27.2 — Cracking of medicinal paraffin and testing the gaseous product • PowerPoint • Discussion | | 7,10,18 | <ul style="list-style-type: none"> • Practice 27.2 |
| | Week 8 | 27.5 The alkenes | <ul style="list-style-type: none"> • Some straight-chain alkenes | <ul style="list-style-type: none"> • PowerPoint | | 2,10 | |
| | Week 8 | 27.6 Physical properties of alkenes | <ul style="list-style-type: none"> • Rise of melting and boiling points of alkenes with the increase of the length of carbon chain in the alkene molecules • Solubility of alkenes in water | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 2,10 | |

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| | Week 8 | 27.7 Important reactions of alkenes | <ul style="list-style-type: none"> • What an addition reaction is • Reaction with bromine solution • Reaction with cold acidified dilute potassium permanganate solution • Test for unsaturation | <ul style="list-style-type: none"> • Activity 27.3 — Investigating the properties of an alkene • Activity 27.4 — Distinguishing between an alkane and an alkene • PowerPoint | | 2,7,10 | • Practice 27.3 |
| | Week 8 | 27.8 Wind power — an alternative source of energy | <ul style="list-style-type: none"> • Wind energy being a renewable energy source • Limitations of using wind energy | • Concept mapping | Notes-taking Reading to learn | 2,7,18 | • Unit exercise |
| | | Unit 28 Addition polymers | | | | | |
| | Week 9 | 28.1 Plastic items in modern homes | • Various uses of plastics in modern homes | <ul style="list-style-type: none"> • PowerPoint • Discussion | Setting learning objectives and doing reflection | 2,10,18 | |
| | Week 9 | 28.2 Why are plastics so useful? | • General properties of plastics | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 2,10,18 | |

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| | Week 9 | 28.3 What is a polymer? | <ul style="list-style-type: none"> • What a polymer is • Polymerization • Natural and man-made polymers | <ul style="list-style-type: none"> • PowerPoint | | 2,10 | |
| | Week 9 | 28.4 Polymerization of ethene | <ul style="list-style-type: none"> • Polymerization of ethene • What addition polymerization is • What addition polymers are • What a repeating unit is • Polythene being an addition polymer • Low density polythene and high density polythene | <ul style="list-style-type: none"> • PowerPoint | | 2,7,10 | <ul style="list-style-type: none"> • Practice 28.1 |
| | Week 10 | 28.5 Some common addition polymers | <ul style="list-style-type: none"> • Polypropene (PP) • Polyvinyl chloride (PVC) • Polystyrene (PS) • Perspex | <ul style="list-style-type: none"> • Activity 28.1 — Investigating the properties of some polymers • Activity 28.2 — Preparing polystyrene | Notes-taking Reading to learn | 2,7,10 | <ul style="list-style-type: none"> • Practice 28.2 |

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| | | | | • PowerPoint | | | |
| | Week 10 | 28.6 Uses of some common addition polymers | <ul style="list-style-type: none"> • Uses and properties of some common addition polymers <ul style="list-style-type: none"> – low density polythene – high density polythene – polypropene – polyvinyl chloride – polystyrene – Perspex | <ul style="list-style-type: none"> • PowerPoint • Discussion • Concept mapping | | 7,10,18 | <ul style="list-style-type: none"> • Practice 28.3 • Unit exercise |
| | | Unit 29 Naming and physical properties of carbon compounds | | | | | |
| | Week 11 | 29.1 Functional groups: centre of reactivity | <ul style="list-style-type: none"> • What a functional group is • Functional groups which members of some homologous series contain | <ul style="list-style-type: none"> • Activity 29.1 — Building molecular models of compounds in different homologous series • PowerPoint | Setting learning objectives and doing reflection | 7,10 | • Practice 29.1 |
| | Week 11 | 29.2 Naming alkanes and | <ul style="list-style-type: none"> • Revising the naming of alkanes and alkenes | <ul style="list-style-type: none"> • PowerPoint | | 7,10 | • Practice 29.2 |

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| | | alkenes | learnt in Topic 7 | | | | |
| | Week 11 | 29.3 IUPAC rules of naming carbon compounds | <ul style="list-style-type: none"> The IUPAC rules of naming Names of parent chains Numerical prefixes Names of substituents | <ul style="list-style-type: none"> PowerPoint | | 10 | |
| | Week 11 | 29.4 Naming haloalkanes | <ul style="list-style-type: none"> Naming haloalkanes containing the halogeno functional group: <ul style="list-style-type: none"> - F - Cl - Br - I | <ul style="list-style-type: none"> PowerPoint | | 7,10 | <ul style="list-style-type: none"> Practice 29.3 |
| | Week 11 | 29.5 Naming alcohols | <ul style="list-style-type: none"> Naming alcohols with the general formula $C_nH_{2n+1}OH$ Naming polyhydric alcohols | <ul style="list-style-type: none"> PowerPoint | | 7,10 | <ul style="list-style-type: none"> Practice 29.4 |
| | Week 11 | 29.6 Naming aldehydes and ketones | <ul style="list-style-type: none"> Naming aldehydes (general formula $RCHO$ where R is an alkyl or aryl group or hydrogen) Naming ketones (general formula $RCOR_1$, | <ul style="list-style-type: none"> PowerPoint | | 7,10 | <ul style="list-style-type: none"> Practice 29.5 |

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| | | | where R and R1 are alkyl or aryl groups) | | | | |
| | Week 11 | 29.7 Naming carboxylic acids | <ul style="list-style-type: none"> Naming carboxylic acids (general formula RCOOH where R is an alkyl or aryl group or hydrogen) | <ul style="list-style-type: none"> PowerPoint | | 7,10 | <ul style="list-style-type: none"> Practice 29.6 |
| | Week 11 | 29.8 Naming esters | <ul style="list-style-type: none"> Naming an ester based on the alcohol and carboxylic acid from which the ester is derived | <ul style="list-style-type: none"> PowerPoint | | 7,10 | <ul style="list-style-type: none"> Practice 29.7 |
| | Week 11 | 29.9 Naming amides | <ul style="list-style-type: none"> Naming amides with an unsubstituted –NH₂ group | <ul style="list-style-type: none"> PowerPoint | | 10 | |
| | Week 11 | 29.10 Naming amines | <ul style="list-style-type: none"> Naming primary amines | <ul style="list-style-type: none"> PowerPoint | | 7,10 | <ul style="list-style-type: none"> Practice 29.8 |
| | Week 12 | 29.11 Intermolecular forces and physical properties of carbon compounds | <ul style="list-style-type: none"> Strength of intermolecular forces in a carbon compound depends on <ul style="list-style-type: none"> – the functional group it contains – the length of its | <ul style="list-style-type: none"> PowerPoint Discussion | Training of higher-order thinking skills | 10 | |

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| | | | carbon chain | | | | |
| | Week 12 | 29.12 Physical properties of haloalkanes | <ul style="list-style-type: none"> Boiling point Solubility in water | <ul style="list-style-type: none"> PowerPoint Discussion | | 10 | |
| | Week 12 | 29.13 Physical properties of alcohols | <ul style="list-style-type: none"> Boiling point Solubility in water | <ul style="list-style-type: none"> PowerPoint Discussion | | 10 | |
| | Week 12 | 29.14 Physical properties of aldehydes and ketones | <ul style="list-style-type: none"> Boiling point Solubility in water | <ul style="list-style-type: none"> PowerPoint Discussion | | 10 | |
| | Week 12 | 29.15 Physical properties of carboxylic acids | <ul style="list-style-type: none"> Boiling point Solubility in water | <ul style="list-style-type: none"> PowerPoint Discussion | | 10 | |
| | Week 12 | 29.16 Physical properties of esters | <ul style="list-style-type: none"> Boiling point Solubility in water | <ul style="list-style-type: none"> PowerPoint Discussion | | 10 | |
| | Week 12 | 29.17 Physical properties of amides | <ul style="list-style-type: none"> Boiling point Solubility in water | <ul style="list-style-type: none"> PowerPoint Discussion | | 10 | |
| | | 29.18 Physical properties of amines | <ul style="list-style-type: none"> Boiling point Solubility in water | <ul style="list-style-type: none"> PowerPoint Discussion | | 10 | |
| | Week 12 | 29.19 Common names of | <ul style="list-style-type: none"> Common names or trivial names of some | <ul style="list-style-type: none"> PowerPoint Concept | | 7,10 | <ul style="list-style-type: none"> Unit exercise |

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| | | carbon compounds | carbon compounds | mapping | | | |
| | | Unit 30 Isomerism | | | | | |
| | Week 13 | 30.1 Isomerism | <ul style="list-style-type: none"> • Structural isomerism • Stereoisomerism | <ul style="list-style-type: none"> • PowerPoint | Setting learning objectives and doing reflection | 10 | |
| | Week 13 | 30.2 Structural isomerism | <ul style="list-style-type: none"> • Chain isomerism • Position isomerism • Functional group isomerism | <ul style="list-style-type: none"> • Activity 30.1 — Building molecular models of structural isomers • PowerPoint • Discussion | | 7,10 | <ul style="list-style-type: none"> • Practice 30.1 |
| | Week 13 | 30.3 <i>Cis-trans</i> isomerism | <ul style="list-style-type: none"> • <i>Cis-trans</i> isomerism exhibited by compounds containing a C=C bond • Explaining the difference in melting point / boiling point /water solubility of two <i>cis-trans</i> isomers | <ul style="list-style-type: none"> • Activity 30.2 — Building molecular models of <i>cis-trans</i> isomers • PowerPoint • Discussion | | 7,10 | <ul style="list-style-type: none"> • Practice 30.2 |
| | Week 13 | 30.4 * Chirality | <ul style="list-style-type: none"> • What a chiral object is | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 10 | |
| | Week | 30.5 | <ul style="list-style-type: none"> • What enantiomers are | <ul style="list-style-type: none"> • PowerPoint | Training of | 10 | |

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| | 13 | Enantiomers* | <ul style="list-style-type: none"> • Characteristic of a simple chiral molecule • Looking at the chiral molecule of CHFCIBr and lactic acid • Identifying chiral carbons in chiral compounds | <ul style="list-style-type: none"> • Discussion • Animation | higher-order thinking skills | | |
| | Week 13 | 30.6 * Test for chirality — plane of symmetry | <ul style="list-style-type: none"> • Determining whether a molecule has a plane of symmetry | <ul style="list-style-type: none"> • Activity 30.3 — Building models of some molecules and determining whether the molecules are chiral • PowerPoint | | 7,10 | <ul style="list-style-type: none"> • Practice 30.3 |
| | Week 13 | 30.7 * Distinguishing the enantiomers of a chiral compound | <ul style="list-style-type: none"> • How enantiomers of a chiral compound perturb plane-polarized light • Polarimeter for measurement of rotation of | <ul style="list-style-type: none"> • PowerPoint • Discussion • Animation • Concept mapping | Training of higher-order thinking skills | 7,10 | <ul style="list-style-type: none"> • Practice 30.4 • Unit exercise |

| School Term | Weeks | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
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| | | | plane polarised light | | | | |
| | Week 14 | Revision week | | | | | |
| | Week 14-16 | Mid-Year Examination | | | | | |
| | Week 17-18 | Christmas & New Year Holiday | | | | | |
| Second Term (3/1/2018- 18/7/2018) | | Unit 31 Typical reactions of selected functional groups | | | Setting learning objectives and doing reflection | | |
| | Week 19 | 31.1 Introduction | <ul style="list-style-type: none"> • Importance of planning synthetic routes for the synthesis of new molecules from readily available molecules | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 10 | |
| | Week 19 | 31.2 Important reactions of alkanes | <ul style="list-style-type: none"> • Combustion • Reaction with halogens — substitution reactions | <ul style="list-style-type: none"> • PowerPoint | | 10 | |
| | Week 19 | 31.3 Addition reactions of alkenes | <ul style="list-style-type: none"> • Addition of hydrogen to alkenes in the presence of catalysts • Addition of halogens | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 7,10 | <ul style="list-style-type: none"> • Practice 31.1 |

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| | | | to alkenes and test for unsaturation with aqueous bromine <ul style="list-style-type: none"> • Addition of hydrogen halides to alkenes and using Markovnikov's rule to predict the major product | | | | |
| | Week 20 | 31.4 Substitution reactions of Haloalkanes | <ul style="list-style-type: none"> • Hydrolysis of haloalkanes to form alcohols | <ul style="list-style-type: none"> • PowerPoint | | 10 | |
| | Week 20 | 31.5 Reactions of alcohols | <ul style="list-style-type: none"> • Primary, secondary and tertiary alcohols • Substitution reactions of alcohols with halides • Elimination reactions — dehydration of alcohols to form alkenes • Oxidation of alcohols | <ul style="list-style-type: none"> • Activity 31.1 — Studying the properties of alcohols • Activity 31.2 — Oxidizing ethanol to ethanoic acid and testing the ethanoic acid produced • PowerPoint | | 7,10 | <ul style="list-style-type: none"> • Practice 31.2 • Practice 31.3 • Practice 31.4 • Practice 31.5 |
| | Week | 31.6 | <ul style="list-style-type: none"> • Oxidation of aldehydes | <ul style="list-style-type: none"> • Activity 31.3 — | | 7,10 | <ul style="list-style-type: none"> • Practice 31.6 |

| School Term | Weeks | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
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| | 21 | Reactions of aldehydes and Ketones | and ketones • Reduction of aldehydes and ketones | Studying the properties of propanal and propanone • PowerPoint | | | |
| | Week 21 | 31.7 Reactions of carboxylic acids | • Reaction with alkalis and hydrogencarbonates • Esterification / Condensation reaction • Reduction • Amides from carboxylic acids | • Activity 31.4 — Studying the reaction between ethanol and ethanoic acid • Activity 31.5 — Identifying unknown carbon compounds • PowerPoint | | 7,10 | • Practice 31.7 |
| | Week 22 | 31.8 Hydrolysis of esters | • Hydrolysis of esters in aqueous acid / alkali • Obtaining the products after the hydrolysis of an ester in alkaline solution | • PowerPoint | | 10 | |
| | Week | 31.9 | • Hydrolysis of amides in | • PowerPoint | | 7,10 | • Practice 31.8 |

| School Term | Weeks | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
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| | 22 | Hydrolysis of amides | aqueous acid / alkali | • Concept mapping | | | • Unit exercise |
| | | Unit 32 Synthesis of carbon compounds | | | | | |
| | Week 23 | 32.1 * Planning a synthesis | <ul style="list-style-type: none"> • Deploying suitable reactions and functional group interconversions to alter the groups attached to a basic carbon skeleton • Percentage yield of a product • Choosing the reagents | <ul style="list-style-type: none"> • PowerPoint • Discussion | Setting learning objectives and doing reflection | 7,10 | • Practice 32.1 |
| | Week 23 | 32.2 Two-step synthetic routes | <ul style="list-style-type: none"> • Working backwards from the target molecule until a suitable starting material can be found • Simple two-step synthetic routes | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 7,10 | • Practice 32.2 |
| | Week 24 | 32.3 * More complicated synthetic routes | <ul style="list-style-type: none"> • Synthetic routes with three or more steps | <ul style="list-style-type: none"> • PowerPoint • Discussion | Training of higher-order thinking skills | 7,10 | • Practice 32.3 |
| | Week | 32.4 | <ul style="list-style-type: none"> • Planning | <ul style="list-style-type: none"> • PowerPoint | | 10 | |

| School Term | Weeks | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
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| | 24 | Laboratory preparation of simple carbon compounds* | <ul style="list-style-type: none"> • Carrying out the reaction to obtain crude product • Separating the crude product from the reaction mixture • Purifying and drying the product • Measuring the percentage yield of the product | | | | |
| | Week 25-26 | Lunar New Year Holiday | | | | | |
| | Week 27 | 32.5 Common separation and purification methods in carbon compound preparation | <ul style="list-style-type: none"> • Common separation and purification methods for liquid products <ul style="list-style-type: none"> – distillation – fractional distillation – liquid-liquid extraction • Common separation and purification method for solid products <ul style="list-style-type: none"> – re-crystallization | • PowerPoint | Notes-taking Reading to learn | 10 | |
| | Week 27 | 32.6 * Preparing 1-bromobutane in the | • Reaction of butan-1-ol with a mixture of sodium bromide and | • Activity 32.1 — Preparing and purifying | Training of higher-order thinking skills | 7,10 | <ul style="list-style-type: none"> • Practice 32.4 • Unit exercise |

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| | | laboratory | concentrated sulphuric acid • Separating the crude product from the reaction mixture • Purifying and drying the product • Calculating the percentage yield of the product | 2-chloro-2-methylpropane • PowerPoint • Concept mapping | | | |
| | | Unit 33 Important organic substances | | | | | |
| | Week 27 | 33.1 Introduction | • Raising the awareness of the importance of organic substances in daily life | • PowerPoint • Discussion | Setting learning objectives and doing reflection | 2,10 | |
| | Week 27 | 33.2 * Aspirin — a common painkiller | • Functional groups acetylsalicylic acid contains • Uses and problems of aspirin tablets | • PowerPoint • Discussion | Notes-taking Reading to learn | 2,10 | |
| | Week | 33.3 | • Detergents can decrease | • PowerPoint | | 2,10 | |

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| | 27 | Detergents | surface tension of water • Soapy detergents • Soapless detergents | | | | |
| | Week 27 | 33.4 How do detergents help water to clean? | • Structure of a typical anionic detergent | • Activity 33.1 — Investigating the properties of detergents • PowerPoint | | 10 | |
| | Week 28 | 33.5 The wetting and emulsifying properties of detergents in relation to their structures | • The wetting property of detergents • The emulsifying property of detergents | • PowerPoint • Animation | | 10 | |
| | Week 28 | 33.6 The cleaning action of detergents | • How does a detergent help to clean | • PowerPoint | | 7,10 | • Practice 33.1 |
| | Week 28 | 33.7 Making soaps and soapless detergents | • Making soaps from fats or oils in school laboratory • Manufacture of soapless detergents from hydrocarbons obtained | • Activity 33.2 — Preparing a soap and testing its properties • PowerPoint | | 10,18 | |

| School Term | Weeks | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
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| | | | from petroleum | | | | |
| | Week 28 | 33.8 * Fats and oils | <ul style="list-style-type: none"> • Structure of triglyceride, glycerol, fatty acid and its salt and equation for saponification | <ul style="list-style-type: none"> • PowerPoint | | 7,10 | <ul style="list-style-type: none"> • Practice 33.2 |
| | Week 28 | 33.9 * Polyesters | <ul style="list-style-type: none"> • Monomers for producing polyesters • Condensation polymerization • Uses of poly(ethylene terephthalate) | <ul style="list-style-type: none"> • PowerPoint | | 7,10,18 | <ul style="list-style-type: none"> • Practice 33.3 |
| | Week 28 | 33.10 * Nylons | <ul style="list-style-type: none"> • Monomers for producing nylons • Condensation polymerization • Uses of nylons | <ul style="list-style-type: none"> • Activity 33.3 — Preparing nylon • PowerPoint • Concept mapping | | 7,10 | <ul style="list-style-type: none"> • Practice 33.4 • Unit exercise • Topic exercise |
| | Week 29 | Uniform Test | | | | | |
| | Week 30 & 31 | Easter Holiday | | | | | |
| | | Topic 9 Chemical Reactions and Energy | | | | | |

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| | | Unit 34 Energy changes in chemical reactions | | | | | |
| | Week 32 | 34.1 What is energy? | <ul style="list-style-type: none"> • Different forms of energy • Unit of energy | <ul style="list-style-type: none"> • PowerPoint • Discussion | Setting learning objectives and doing reflection | 2,10 | |
| | Week 32 | 34.2 Specific heat capacity | <ul style="list-style-type: none"> • Calculations involving specific heat capacity and heat capacity | <ul style="list-style-type: none"> • PowerPoint | | 7,10 | <ul style="list-style-type: none"> • Practice 34.1 |
| | Week 32 | 34.3 The system and the surroundings | <ul style="list-style-type: none"> • Law of conservation of energy | <ul style="list-style-type: none"> • PowerPoint | | 2,10 | |
| | Week 32 | 34.4 Internal energy of a system | <ul style="list-style-type: none"> • Introducing the term 'enthalpy change' • Difference between enthalpy change and internal energy change is usually small in most cases | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 2,10 | |
| | Week 33 | 34.5 Enthalpy change of an exothermic reaction | <ul style="list-style-type: none"> • What an exothermic reaction is • Enthalpy level diagram | <ul style="list-style-type: none"> • Activity 34.1 — Classifying whether | | 10 | |

| School Term | Weeks | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
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| | | | of an exothermic reaction | reactions are exothermic or endothermic • PowerPoint | | | |
| | Week 33 | 34.6 Enthalpy change of an endothermic reaction | <ul style="list-style-type: none"> • What an endothermic reaction is • Enthalpy level diagram of an endothermic reaction | • PowerPoint | | 7,10 | • Practice 34.2 |
| | Week 33 | 34.7 Enthalpy changes during physical and chemical changes | <ul style="list-style-type: none"> • Enthalpy change during the melting of ice • Enthalpy change during the combustion of methane | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 2,7,10 | • Practice 34.3 |
| | Week 33 | 34.8 Thermochemical equations | • Writing and interpreting Thermochemical equations | • PowerPoint | | 7,10 | • Practice 34.4 |
| | Week 33 | 34.9 Explaining energy changes — breakage and formation of chemical bonds | • Exothermic reaction — the amount of energy released in the bond-forming step is greater than the amount of energy used in the bond-breaking step | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 7,10 | • Practice 34.5 |

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| | | | <ul style="list-style-type: none"> Endothermic reaction — the amount of energy released in the bond-forming step is less than the amount of energy used in the bond-breaking step | | | | |
| | Week 33 | 34.10 Standard conditions for measuring enthalpy changes | <ul style="list-style-type: none"> What the standard conditions are | <ul style="list-style-type: none"> PowerPoint | | 7,10 | <ul style="list-style-type: none"> Practice 34.6 |
| | Week 34 | 34.11 Standard enthalpy change of reaction | <ul style="list-style-type: none"> Definition of standard enthalpy change of reaction | <ul style="list-style-type: none"> PowerPoint | | 10 | |
| | Week 34 | 34.12 Standard enthalpy change of formation | <ul style="list-style-type: none"> Definition of standard enthalpy change of formation Enthalpy level diagram representing standard enthalpy change of formation Standard enthalpy changes of formation of some common substances | <ul style="list-style-type: none"> PowerPoint Discussion | | 10 | |

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| | | | <ul style="list-style-type: none"> • Making use of enthalpy change of formation to compare the stability of a compound and its constituent elements | | | | |
| | Week 34 | 34.13 Standard enthalpy change of combustion | <ul style="list-style-type: none"> • Definition of standard enthalpy change of combustion • Enthalpy level diagram representing standard enthalpy change of combustion • Standard enthalpy changes of combustion of some common substances | <ul style="list-style-type: none"> • PowerPoint | | 7,10 | <ul style="list-style-type: none"> • Practice 34.7 |
| | Week 34 | 34.14 Standard enthalpy change of neutralization | <ul style="list-style-type: none"> • Definition of standard enthalpy change of neutralization • Standard enthalpy change of neutralization involving a strong acid and a strong alkali | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 10 | |

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| | | | <ul style="list-style-type: none"> Standard enthalpy change of neutralization involving either a weak acid or a weak alkali or both | | | | |
| | Week 34 | 34.15 Determining enthalpy changes of chemical reactions | <ul style="list-style-type: none"> Experiment and calculation for determining the enthalpy change of neutralization between hydrochloric acid and sodium hydroxide solution Sources of inaccuracy in the experiment Determining the heat capacity of the polystyrene calorimeter | <ul style="list-style-type: none"> Activity 34.2 — Determining the enthalpy change of a reaction Activity 34.3 — Determining the enthalpy changes of neutralization PowerPoint Discussion | | 7,10 | <ul style="list-style-type: none"> Practice 34.8 |
| | Week 34 | 34.16 Determining enthalpy changes of combustion | <ul style="list-style-type: none"> Determining the enthalpy change of combustion of ethanol | <ul style="list-style-type: none"> Activity 34.4 — Determining the enthalpy changes of combustion of some alcohols | | 7,10 | <ul style="list-style-type: none"> Practice 34.9 Unit exercise |

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| | | | | <ul style="list-style-type: none"> • PowerPoint • Concept mapping | | | |
| | | Unit 35 Hess's Law and its applications | | | | | |
| | Week 35 | 35.1 Hess's Law | <ul style="list-style-type: none"> • Definition of Hess's Law • Introducing Hess's Law via the oxidation of nitrogen to nitrogen dioxide • Enthalpy change cycle relating the enthalpy changes of processes involved in the reaction between gaseous nitrogen and oxygen to form nitrogen dioxide gas | <ul style="list-style-type: none"> • PowerPoint • Discussion | Setting learning objectives and doing reflection | 7,10 | <ul style="list-style-type: none"> • Practice 35.1 |
| | Week 35 | 35.2 Using Hess's Law to determine enthalpy changes that cannot be easily obtained by experiment | <ul style="list-style-type: none"> • Applying Hess's Law and making use of the enthalpy changes of Haber process (making ammonia through the reaction between | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 7,10 | <ul style="list-style-type: none"> • Practice 35.2 |

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| | | | nitrogen and hydrogen) and the formation of ammonia through the reaction between hydrazine and hydrogen, determine the enthalpy change of formation of hydrazine <ul style="list-style-type: none"> • Enthalpy change cycle used for determining ΔH | | | | |
| | Week 35 | 35.3 Determining the enthalpy change of formation of magnesium hydroxide from enthalpy changes of other reactions | <ul style="list-style-type: none"> • Determining the enthalpy change of the reaction between magnesium and hydrochloric acid • Determining the enthalpy change of the reaction between magnesium hydroxide and hydrochloric acid • Calculating the enthalpy change of formation of magnesium hydroxide | <ul style="list-style-type: none"> • Activity 35.1 — Determining the enthalpy change of formation of magnesium oxide • Activity 35.2 — Determining the enthalpy change of thermal decomposition of potassium hydrogencarbonat | Training of higher-order thinking skills | 7,10 | <ul style="list-style-type: none"> • Practice 35.3 |

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| | | | | e • PowerPoint | | | |
| | Week 35 | 35.4 Determining the standard enthalpy change of formation of a compound from standard enthalpy changes of combustion | • ΔH_f [compound] = $\Sigma \Delta H_c$ [constituent elements] - ΔH_c [compound] | • PowerPoint | Training of higher-order thinking skills | 7,10 | • Practice 35.4 |
| | Week 35 | 35.5 Determining the standard enthalpy change of a reaction from standard enthalpy changes of formation | • $\Delta H_r = \Sigma \Delta H_f$ [products] - $\Sigma \Delta H_f$ [reactants] | • PowerPoint • Concept mapping | Training of higher-order thinking skills | 7,10 | • Practice 35.5 • Unit exercise • Topic exercise |
| | | Topic 10 Rate of Reaction | | | | | |
| | | Unit 36 An introduction to rate of reaction | | | | | |
| | Week 36 | 36.1 Fast and slow reactions | • Examples of fast and slow reactions | • PowerPoint • Discussion | Setting learning | 2,10 | |

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| | | | | | objectives and doing reflection | | |
| | Week 36 | 36.2 The rate of a reaction | <ul style="list-style-type: none"> Determining the rate of a reaction by measuring – the change in concentration (or amount) of a reactant per unit time, or– the change in concentration (or amount) of a product per unit time | <ul style="list-style-type: none"> PowerPoint | | 10 | |
| | Week 36 | 36.3 Instantaneous rate of reaction | <ul style="list-style-type: none"> Determining the instantaneous rate of reaction by measuring the slope of the tangent to a concentration-time curve at a particular time | <ul style="list-style-type: none"> PowerPoint Discussion | | 7,10 | <ul style="list-style-type: none"> Practice 36.1 |
| | Week 36 | 36.4 Methods for following the progress of a reaction | <ul style="list-style-type: none"> Methods using a variety of physical properties of the reaction mixture Titrimetric analysis | <ul style="list-style-type: none"> PowerPoint Discussion | Notes-taking Reading to learn | 10 | |
| | Week 36 | 36.5 Following the progress of a reaction by measuring | <ul style="list-style-type: none"> Following the progress of the reaction between magnesium and dilute | <ul style="list-style-type: none"> Activity 36.1 — Following the progress | | 10 | |

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| | | the change in volume of a gaseous product | hydrochloric acid by measuring the volume of hydrogen produced | of a reaction by measuring the change in volume of a gaseous product. • PowerPoint | | | |
| | Week 36 | 36.6 Following the progress of a reaction by measuring the change in mass of the reaction mixture | • Following the progress of the reaction between calcium carbonate and dilute hydrochloric acid by measuring the loss in mass of the reaction mixture | • PowerPoint | | 10 | |
| | Week 36 | 36.7 Following the progress of a reaction by measuring the change in pressure of the reaction mixture | • Following the progress of the reaction between magnesium and dilute hydrochloric acid using a pressure sensor | • PowerPoint | | 7,10 | • Practice 36.2 |
| | Week 36 | 36.8 Following the progress of a reaction by measuring the | • Following the progress of the oxidation of oxalate ions by permanganate ions using a colorimeter | • PowerPoint | | 10 | |

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| | | change in colour intensity of the reaction mixture | <ul style="list-style-type: none"> Basic components of a colorimeter | | | | |
| | Week 36 | 36.9 Following the progress of a reaction by measuring the change in turbidity of the reaction mixture | <ul style="list-style-type: none"> Following the progress of the reaction between sodium thiosulphate solution and dilute sulphuric acid by measuring the time to reach an opaque stage | <ul style="list-style-type: none"> PowerPoint | | 7,10 | <ul style="list-style-type: none"> Practice 36.3 |
| | Week 36 | 36.10 * Following the progress of a reaction using titrimetric analysis | <ul style="list-style-type: none"> Following the progress of the alkaline hydrolysis of ethyl ethanoate Common quenching techniques Advantages and disadvantages of using titrimetric analysis | <ul style="list-style-type: none"> PowerPoint Discussion Concept mapping | Training of higher-order thinking skills | 7,10 | <ul style="list-style-type: none"> Unit exercise |
| | | Unit 37 Factors affecting the rate of a reaction | | | | | |
| | Week 37 | 37.1 Factors affecting the rate of a reaction | <ul style="list-style-type: none"> Concentration Surface area Temperature | <ul style="list-style-type: none"> PowerPoint Discussion | Setting learning objectives and | 10 | |

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| | | | <ul style="list-style-type: none"> • Catalyst | | doing reflection | | |
| | Week 37 | 37.2 Studying the effect of change in concentration of a reactant on the rate of a reaction | <ul style="list-style-type: none"> • Effect of varying the concentration of permanganate ions on the rate of its reaction with oxalate ions in an acidic solution | <ul style="list-style-type: none"> • Activity 37.1 — Investigating the effect of varying the concentration of hydrochloric acid on the rate of its reaction with magnesium • Activity 37.2 — Investigating the effect of varying the concentration of hydroxide ion on the rate of its reaction with phenolphthalein • PowerPoint | | 7,10 | <ul style="list-style-type: none"> • Practice 37.1 |
| | Week | 37.3 | <ul style="list-style-type: none"> • Comparing the rate | <ul style="list-style-type: none"> • Activity 37.3 — | | 7,10 | <ul style="list-style-type: none"> • Practice 37.2 |

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| | 37 | Studying the effect of change in surface area of a solid reactant on the rate of a reaction | of reaction of dilute hydrochloric acid with powdered calcium carbonate / calcium carbonate lumps | Investigating the effect of varying the surface area of marble chips on the rate of their reaction with dilute hydrochloric acid • PowerPoint • Discussion | | | |
| | Week 37 | 37.4 Studying the effect of change in temperature on the rate of a reaction | • Effect of varying the temperature on the rate of a reaction | • Activity 37.4 — Investigating the effect of varying the temperature on the rate of the reaction between sodium thiosulphate solution and dilute sulphuric acid | | 7,10 | • Practice 37.3 |

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| | | | | <ul style="list-style-type: none"> • Activity 37.5 — Investigating the effect of varying the temperature on the rate of the reaction between ingredients of Alka Seltzer tablet • PowerPoint • Discussion | | | |
| | Week 37 | 37.5 Studying how the presence of a catalyst affects the rate of a reaction | <ul style="list-style-type: none"> • What a catalyst is • Positive and negative catalysts | <ul style="list-style-type: none"> • Activity 37.6 — Catalyzing the decomposition of hydrogen peroxide in solution • PowerPoint | | 10 | |
| | Week 37 | 37.6 Reaction rate and effective collisions | <ul style="list-style-type: none"> • Why does reaction rate increase with the concentration of reactants? • Why does reaction rate | <ul style="list-style-type: none"> • PowerPoint • Discussion | Notes-taking Reading to learn | 10 | |

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| | | | increase with the surface area of a solid reactants? • Why does reaction rate increase with temperature? | | | | |
| | Week 37 | 37.7 Why does reaction rate increase with the concentration of reactants? | • Industrial catalysts • Catalytic converters in car exhaust systems • Hydrogenation of unsaturated vegetable oils | • PowerPoint | | 7,10 | • Practice 37.4 |
| | Week 37 | 37.8 Why does reaction rate increase with the surface area of a solid reactant? | | • PowerPoint | | 10 | |
| | Week 37 | 37.9 Why does reaction rate increase with the temperature? | | • PowerPoint | | 7,10 | • Practice 37.5 |
| | Week 37 | 37. 10 * Applications of catalysts | | • PowerPoint • Discussion | Notes-taking Reading to learn | 2,10 | |
| | Week 37 | 37.11 * Enzymes | • Yeast and fermentation • Uses of enzymes in industries | • PowerPoint • Discussion • Concept | | 2,7,10 | • Unit exercise |

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| | | | | mapping | | | |
| | | Unit 38 Gas volume calculations | | | | | |
| | Week 38 | 38.1 The relationship between gas volume and moles: Avogadro's Law | <ul style="list-style-type: none"> • Equal volumes of gases at the same temperature and pressure contain equal numbers of particles | <ul style="list-style-type: none"> • PowerPoint | Setting learning objectives and doing reflection | 10 | |
| | Week 38 | 38.2 Molar volume of a gas | <ul style="list-style-type: none"> • Calculations involving mass, number of moles and volume of a gas | <ul style="list-style-type: none"> • Activity 38.1 — Determining the molar volume of carbon dioxide • PowerPoint | | 7,10 | <ul style="list-style-type: none"> • Practice 38.1 • Practice 38.2 |
| | Week 38 | 38.3 Calculations from chemical equations | <ul style="list-style-type: none"> • Steps for calculating the quantities of reactants or products in a reaction • Calculations involving masses and gas volumes | <ul style="list-style-type: none"> • PowerPoint | | 7,10 | <ul style="list-style-type: none"> • Practice 38.3 |
| | Week 38 | 38.4 Gas volume – gas volume calculations from chemical equations | <ul style="list-style-type: none"> • Calculations involving gas volumes | <ul style="list-style-type: none"> • PowerPoint • Concept mapping | | 7,10 | <ul style="list-style-type: none"> • Practice 38.4 • Unit exercise • Topic exercise |

| School Term | Weeks | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
|-------------|---------|--|--|--|--|--|------------------------------|
| | | Topic 11 Chemical Equilibrium | | | | | |
| | | Unit 39 An introduction to chemical equilibrium | | | | | |
| | Week 38 | 39.1 Irreversible and reversible reactions | <ul style="list-style-type: none"> • What irreversible reactions and reversible reactions are • Examples of reversible reactions – aqueous solution containing cobalt(II) ions – esterification | <ul style="list-style-type: none"> • PowerPoint • Discussion | Setting learning objectives and doing reflection | 7,10 | • Checkpoint |
| | Week 38 | 39.2 Equilibrium | <ul style="list-style-type: none"> • Introducing static equilibrium and dynamic equilibrium | <ul style="list-style-type: none"> • PowerPoint | | 10 | |
| | Week 38 | 39.3 Chemical equilibrium for a reversible reaction | <ul style="list-style-type: none"> • Variation of concentrations and reaction rates with time during the course of a reversible reaction • Rate of forward reaction = rate of backward reaction at equilibrium | <ul style="list-style-type: none"> • PowerPoint | | 10 | |

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|-------------|---------|---|--|--|--|--|--|
| | Week 38 | 39.4 The importance of a closed system | <ul style="list-style-type: none"> Explaining the importance of a closed system when establishing a state of equilibrium | <ul style="list-style-type: none"> PowerPoint Discussion | | 7,10 | <ul style="list-style-type: none"> Checkpoint |
| | Week 38 | 39.5 Equilibrium established from either direction of a reaction | <ul style="list-style-type: none"> Using an example to illustrate that equilibrium can be reached from either direction of a reaction | <ul style="list-style-type: none"> PowerPoint Discussion | Training of higher-order thinking skills | 10 | |
| | Week 38 | 39.6 Effect of changing conditions on chemical equilibrium systems | <ul style="list-style-type: none"> Effect of concentration changes on the chromate / dichromate system | <ul style="list-style-type: none"> Activity 39.1 — Investigating the effects of concentration changes on two chemical equilibrium systems PowerPoint | Training of higher-order thinking skills | 10 | |
| | Week 38 | 39.7 Characteristics of a system in dynamic equilibrium | <ul style="list-style-type: none"> Summarizing the characteristics of a system in dynamic equilibrium | <ul style="list-style-type: none"> PowerPoint | | 10 | |
| | Week 38 | 39.8 The equilibrium constant | <ul style="list-style-type: none"> Illustrating that the equilibrium constant, K_c, | <ul style="list-style-type: none"> PowerPoint | | 10 | |

| School Term | Weeks | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
|-------------|---------|---|--|--|--------------------------------|--|------------------------------|
| | | | for a specific reaction always has the same value at a given temperature by using an example | | | | |
| | Week 38 | 39.9 The equilibrium law | <ul style="list-style-type: none"> • Writing the expression for equilibrium constant, K_c, from equilibrium concentrations • Units of equilibrium constant • Relationship of equilibrium constant to the chemical equation | • PowerPoint | | 7,10 | • Checkpoint |
| | Week 39 | 39.10 Calculating equilibrium constants | • Calculating equilibrium constants from equilibrium concentrations | • PowerPoint | | 7,10 | • Checkpoint |
| | Week 39 | 39.11 * What does the equilibrium constant tell us? | <ul style="list-style-type: none"> • Judging the extent of a reaction • Predicting the direction of a reaction by comparing Q_c and K_c • Calculating equilibrium concentrations | <ul style="list-style-type: none"> • PowerPoint • Discussion | | 7,10 | • Checkpoint |
| | Week | 39.12 | • Writing an expression | • PowerPoint | | 10 | |

| School Term | Weeks | Topics/ Extended Parts* | Learning Objectives/ Teaching Focus | Teaching and Learning Activities | Self-directed Learning Skills* | Values [#] / Basic Law Education | Consolidation and Assessment |
|-------------|---------------|---|---|---|--------------------------------------|--|---|
| | 39 | Equilibrium systems involving components in more than one state* | for equilibrium constant of an equilibrium system involving components in more than one state | | | | |
| | Week 39 | 39.13 * Determining the equilibrium constant for an esterification reaction experimentally | <ul style="list-style-type: none"> Determining the equilibrium constant, K_c, for an esterification reaction — the reaction between ethanoic acid and propan-2-ol | <ul style="list-style-type: none"> Activity 39.2 — Determining the equilibrium constant, K_c, for an esterification reaction between ethanoic acid and propan-1-ol PowerPoint Concept mapping | | 7,10 | <ul style="list-style-type: none"> Checkpoint Unit exercise |
| | Week 39 | Revision Week | | | | | |
| | Week 40 to 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 |