Syllabus Overview

The syllabus for the Diploma Programme chemistry course is divided into three parts: the core, the AHL material and the options. The Chemistry data booklet is an integral part of the syllabus and should be used in conjunction with the syllabus. Students should use the data booklet during the course, and they should be issued with clean copies of it for the paper 2 and paper 3 examinations.

		Teaching Hours
Core		**80**
Topic 1:	Quantitative chemistry	12.5
Topic 2:	Atomic structure	4
Topic 3:	Periodicity	6
Topic 4:	Bonding	12.5
Topic 5:	Energetics	8
Topic 6:	Kinetics	5
Topic 7:	Equilibrium	5
Topic 8:	Acids and bases	6
Topic 9:	Oxidation and reduction	7
Topic 10:	Organic chemistry	12
Topic 11:	Measurement and data processing	2
AHL		**55**
Topic 12:	Atomic Structure	3
Topic 13:	Periodicity	4
Topic 14:	Bonding	5
Topic 15:	Energetics	8
Topic 16:	Kinetics	6
Topic 17:	Equilibrium	4
Topic 18:	Acids and bases	10
Topic 19:	Oxidation and reduction	5
Topic 20:	Organic chemistry	10

Options

Options SL and HL

	Teaching Hours	
Option A: Modern analytical chemistry	15/22	
Option B: Human biochemistry		15/22
Option C: Chemistry in industry and technology	15/22	
Option D: Medicines and drugs		15/22
Option E: Environmental chemistry	15/22	
Option F: Food chemistry		15/22
Option G: Further organic chemistry	15/22	

Students at SL are required to study any two options from A-G.
The duration of each option is 15 hours.

Students at HL are required to study any two options from A-G.
The duration of each option is 22 hours.

Syllabus Outline

		Teaching hours
Core		**80**
Topic 1:	**Quantitative chemistry**	**12.5**
1.1	The mole concept and Avogadro's constant	2
1.2	Formulas	3
1.3	Chemical Equations	1
1.4	Mass and gaseous volume relationships in chemical reactions	4.5
1.5	Solutions	2
Topic 2:	**Atomic structure**	**4**
2.1	The atom	1
2.2	The mass spectrometer	1
2.3	Electron arrangement	2
Topic 3:	**Periodicity**	**6**
3.1	The periodic table	1
3.2	Physical Properties	2
3.3	Chemical properties	3
Topic 4:	**Bonding**	**12.5**
4.1	Ionic bonding	2
4.2	Covalent bonding	6
4.3	Intermolecular forces	2
4.4	Metallic bonding	0.5
4.5	Physical Properties	2
Topic 5:	**Energetics**	**8**
5.1	Exothermic and endothermic reactions	1
5.2	Calculation of enthalpy changes	3
5.3	Hess's Law	2
5.4	Bond enthalpies	2
Topic 6:	**Kinetics**	**5**
6.1	Rates of reaction	2
6.2	Collision theory	3
Topic 7:	**Equilibrium**	**5**
7.1	Dynamic equilibrium	1
7.2	The position of equilibrium	4

Teaching Hours

Topic 8: Acids and bases 6

8.1	Theories of acids and bases	2
8.2	Properties of acids and bases	1
8.3	Strong and weak acids and bases	2
8.4	The pH scale	1

Topic 9: Oxidation and reduction 7

9.1	Introduction to oxidation and reduction	2
9.2	Redox Equations	1
9.3	Reactivity	1
9.4	Voltaic cells	1
9.5	Electrolytic cells	2

Topic 10: Organic chemistry 12

10.1	Introduction	2
10.2	Alkenes	2
10.3	Alkenes	2
10.4	Alcohols	1
10.5	Halogenoalkanes	2
10.6	Reaction pathways	1

Topic 11: Measurement and data processing 2

11.1	Uncertainty and error in measurement	1
11.2	Uncertainties in calculated results	0.5
11.3	Graphical techniques	0.5

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Topic 12: Atomic Structure 3

12.1	Electron configuration	3

Topic 13: Periodicity 4

13.1	Trends across period 3	2
13.2	First-row-d-block elements	2

Topic 14: Bonding 5

14.1	Shapes of molecules and ions	1
14.2	Hybridization	2
14.3	Delocalization of electrons	2

Topic 15: Energetics 8

15.1	Standard enthalpy changes of reaction	1.5
15.2	Born-Haber Cycle	2.5
15.3	Entropy	1.5
15.4	Spontaneity	2.5

Topic 16:	**Kinetics**		**6**
16.1	Rate expression		3
16.2	Reaction mechanism	1	
16.3	Activation energy		2
Topic 17:	**Equilibrium**		**4**
17.1	Liquid-vapour equilibrium		2
17.2	The equilibrium law	2	
Topic 18:	**Acids and bases**		**10**
18.1	Calculations involving acids and bases		4
18.2	Buffer solutions		2
18.3	Salt hydrolysis		1
18.4	Acid-base titrations		2
18.5	Indicators	1	
Topic 19:	**Oxidation and reduction**		**5**
19.1	Standard electrode potential		3
19.2	Electrolysis		2
Topic 20:	**Organic chemistry**		**10**
20.1	Introduction		1
20.2	Nucleophillic substitution reactions		2
20.3	Elimination reactions	1	
20.4	Condensation reactions		2
20.5	Reaction pathways		1
20.6	Stereoisomerism		3

Options SL and HL

Students at SL study the core of these options and students at HL study the whole option (that is, the core and extension material).

	Option A: Modern analytical chemistry		**15/22**
	Core (SL and HL)		15
A1	Analytical techniques	1	
A2	Principles of spectroscopy		2
A3	Infared (IR) spectroscopy		3
A4	Mass spectrometry		2
A5	Nuclear magnetic resonance (NMR) spectroscopy	2	
A6	Atomic absorption (AA) spectroscopy		3
A7	Chromatography		2
	Extension (HL only)		7
A8	Visible and ultraviolet (UV-Vis) spectroscopy		3
A9	Nuclear magnetic resonance (NMR) spectroscopy	2	
A10	Chromatography		2
	Option B: Human biochemistry		**15/22**

Core (SL and HL)			15
B1	Energy		0.5
B2	Proteins		3
B3	Carbohydrates		3
B4	Lipids		3.5
B5	Micronutrients and macronutrients		2
B6	Hormones	3	
Extension (HL only)			7
B7	Enzymes		3
B8	Nucleic Acids		3
B9	Respiration		1

Option C: Chemistry in industry and technology 15/22

Core (SL and HL)			15
C1	Iron, steel and aluminum		3.5
C2	The oil industry		2
C3	Addition polymers		2
C4	Catalysts		1.5
C5	Fuel cells and rechargeable batteries		2
C6	Liquid crystals		2
C7	Nanotechnology		2
Extension (HL only)			7
C8	Condensation polymers		1
C9	Mechanisms in the organic chemical industry		1
C10	Silicon and photovoltaic cells		1
C11	Liquid crystals		2
C12	The chlor-alkali industry		2

Option D: Medicines and drugs 15/22

Core (SL and HL)			15
D1	Pharmaceutical products		2
D2	Antacids		1
D3	Analgesics	3	
D4	Depressants		3
D5	Stimulants	2.5	
D6	Antibacterials		2
D7	Antivirals		1.5
Extension (HL only)			7
D8	Drug action		2.5
D9	Drug design		2.5
D10	Mind-altering drugs	2	

Option E: Environmental chemistry 15/22

Core (SL and HL)			15
E1	Air pollution		2
E2	Acid deposition		1.5
E3	Greenhouse effect		1.5
E4	Ozone depeletion		1.5

E5	Dissolved oxygen in water	1.5
E6	Water treatment	2.5
E7	Soil	2.5
E8	Waste	2
Extension (HL only)		7
E9	Ozone depletion	1
E10	Smog	2
E11	Acid deposition	1
E12	Water and soil	3

Option F: Food chemistry 15/22

Core (SL and HL)		15
F1	Food groups	2
F2	Fats and oils	3
F3	Shelf life	4
F4	Colour	3
F5	Genetically modified foods	1
F6	Texture	2
Extension (HL only)		7
F7	Oxidative rancidity (auto-oxidation)	1
F8	Antioxidants	1
F9	Stereochemistry in food	2
F10	Chemical structure and color	3

Option G: Further organic chemistry 15/22

Core (SL and HL)			15
G1	Electrophillic addition reactions	3	
G2	Nucleophillic addition reactions	2	
G3	Elimination Reactions	1	
G4	Addition- elimination reactions	1	
G5	Arenes		2.5
G6	Organometallic chemistry		2.5
G7	Reaction pathways		1
G8	Acid-base reactions		2
Extension (HL only)			7
G9	Addition-elimination reactions	2	
G10	Electrophillic substitution reactions		4
G11	Reaction pathways	1	