

Diploma Programme subject outline—Group 4: Chemistry			
School name	Alameda International		School Code 006092
Name of the DP subject <i>(indicate language)</i>	Chemistry SL - English		
Name of the teacher who completed this outline	Merinda Sautel	Date of IB training	June 2016
Date when outline was completed	Revised 2/3/2020	Name of workshop <i>(indicate name of subject and workshop category)</i>	IB Chemistry - Cat 2

	Topic/unit (as identified in the IB subject guide) <i>State the topics/units in the order you are planning to teach them.</i>	Contents Please click on links to access the notes.	Allocated time		Assessment instruments to be used	Resources <i>List the main resources to be used, including information technology if applicable.</i>
			One class is	80 minutes.		
			In one week there are	2-3 classes.		
Year 1	Topic 1, 11.1, 11.2 Stoichiometric relationships/ Measurement and data processing	Topic 1.1 - Matter and chemical change Topic 1.2 - The mole concept Topic 1.3 - Reacting Masses and Volumes Topic 11.1 - Uncertainties and Errors Topic 11.2 - Graphical Techniques	Required teaching hours - 13.5 plus 4 for 11.1 and 11.2 18 hours of actual instruction		Formative assessments such as quizzes, online activities, and warm ups and summative assessments such as unit assessments and performance based assessments will be used in Chemistry SL. Use of IB rubrics with non-IB assessments will be used to ensure consistency throughout the course. The use of formative and summative assessments will	Catrin Brown, Mike Ford. Pearson Baccalaureate: Higher Level Chemistry – 2nd ed (USA Edition) . Pearson Education IB Chemistry Question Bank, IBO Chromebooks 1:1 Power Points developed by Merinda
	Topic 2 Atomic structure	Topic 2.1 - The nuclear atom Topic 2.2 - Electron configuration	Required teaching hours - 6 7 hours of actual instruction			
	Topic 3 Periodicity	Topic 3.1 - The Periodic Table Topic 3.2 - Periodic Trends	Required teaching hours - 6 8 hours of actual instruction			
	Topic 10 Organic Chemistry	Topic 10.1 - Fundamentals of organic chemistry Topic 10.2 - Functional group chemistry	Required teaching hours - 11 15 hours of actual instruction			

				be used to monitor student progress and understanding. If needed, re-teaching or differentiation will occur to help those students with weaknesses in any specific area.	Sautel Pasco Probeware Lab and chemical supplies and equipment
	Topic 4 Bonding	Topic 4.1 - Ionic bonding and structure Topic 4.2 - Covalent bonding Topic 4.3 - Covalent structures Topic 4.4 - Intermolecular forces Topic 4.5 - Metallic bonding	Required teaching hours - 13.5 15 hours of actual instruction		
	Topic 5 Thermochemistry	Topic 5.1 - Measuring energy changes Topic 5.2 - Hess's Law Topic 5.3 - Bond enthalpies	Required teaching hours - 9 12 hours of actual instruction		
Year 2	Topic 6 Kinetics	Topic 6.1 - Collision theory and rates of reaction	Required teaching hours - 7 7 hours of actual instruction		
	Topic 7 Equilibrium	Topic 7.1 - Equilibrium	Required teaching hours - 4.5 5 hours of actual instruction		
	Topic 8 Acids and Bases	Topic 8.1 - Theories of acids and bases Topic 8.2 - Properties of acids and bases Topic 8.3 - The pH scale Topic 8.4 - Strong and weak acids/bases Topic 8.5 - Acid Deposition	Required teaching hours - 6.5 9 hours of actual instruction		
	Topic 9 Electrochemistry	Topic 9.1 - Oxidation and reduction Topic 9.2 - Electrochemical Cells	Required teaching hours - 8 11 hours of actual instruction		
	Topic 11.3 Spectroscopic analysis	Topic 11.3 - Spectroscopic identification of organic compounds	Required teaching hours - 6 for 11.3 7 hours of actual instruction		
	Option C Energy	Topic C1 - Energy sources Topic C2 - Fossil fuels Topic C3 - Nuclear fission and fusion Topic C4 - Solar energy Topic C5 - Global warming	Required teaching hours - 15 16 hours of actual instruction		

1. The group 4 project

The Group 4 Project is a project that has been designed by IB to foster collaboration throughout the different scientific disciplines. The Group 4 project at Alameda International will include students from Sports, Exercise and Health SL and Chemistry SL. This interdisciplinary project requires students to analyze a common topic or problem. The process of this investigation and collaborative effort is the focus of the Group 4 project not the results of the scientific investigation. Multiple criteria will be used by the student in a self – evaluation form to call attention to the student’s strengths and weaknesses experienced during the Group 4 project. **Students will be given the opportunity to choose a topic with guidance from the teachers** and this topic will address aims 7 and 8 of the Group 4 subjects. The Group 4 project will take place the first semester of the junior year. The Group 4 project requires 10 hours and has been divided into three stages.

Stages	Time	Stage Activities
<i>Planning</i>	2 hours	• Introduction Brainstorming
<i>Action</i>	6 hours	• Topic Research • Collaboration • Investigation Findings
<i>Evaluation</i>	2 hours	• Presentation of Information • Must include successes and failures

2. IB practical work and the internal assessment requirement to be completed during the course

Name of the topic	Experiment	Any ICT used? <i>Remember you must use all five within your programme.</i>
Topic 1 - Mixtures	Green Ink Lab	
Topic 1 - Phase changes	Heating Curve Lab	Data logging
Topic 1 - Mole conversion	Chalk Lab	
Topic 1 - Empirical formulas	Empirical Formula of Silver Oxide	
Topic 1 - Gas Laws	Ideal Gas Law Lab	
Topic 1 - Stoichiometry	Stoichiometry Lab	
Topic 1 - Molar volume	Molar Volume of a Gas Lab	
Topic 2 - Atomic Structure	Models of the Atom activity	

Topic 3 - Periodicity	Ionization Energy Activity	Graph plotting
Topic 10 - Organic chemistry	Models Lab	
Topic 10 - Organic chemistry	Making an Ester Lab	
Topic 4 - Bonding	VSEPR Models Lab	
Topic 5 - Thermochemistry	Specific Heat of Marbles Lab	Spreadsheet
Topic 5 - Thermochemistry	Specific Heat of Aluminum Lab	
Topic 5 - Thermochemistry	Heat of Combustion of Ethanol Lab	
Topic 5 - Thermochemistry	Heat of Reaction Lab (NaOH and HCl)	
Topic 5 - Thermochemistry	Heat of Reaction of Zn and Copper II Sulfate	
Topic 5 - Thermochemistry	Enthalpy of Neutralization Lab	Data Logging
Topic 6 - Kinetics	Rate of Reaction Lab	
Topic 7 - Equilibrium	Equilibrium Straw Lab	
Topic 7 - Equilibrium	Le Chatelier Simulations	Computer Simulation
Topic 8 - Acids and Bases	Titration Lab	Graph plotting
Topic 9 - Redox	Galvanic Cell Pasco Lab	Data Logging
Group 4 Project	Group 4 Project	Database use
Internal assessment	Internal Assessment	Spreadsheets and various others by students

3. Laboratory facilities

In August 2009, Alameda International Jr/Sr High School opened a brand new science wing consisting of 8 state of the art classrooms and all new equipment. Currently, it has two chemistry, two biology, one Sports Exercise and Health and one earth science classroom. Each classroom is outfitted with a Smartboard Interactive whiteboard, projector, and audio enhancement. Each of the types of classrooms shares a spacious storeroom. In addition to the new classrooms, new science equipment was purchased for each of the programs including Pasco Probeware data collection equipment.

The IB chemistry room has the following equipment: Two fume hoods, safety shower/eye wash/fire blanket/spill control kit/fire extinguisher, lab stations with lab equipment drawers/sinks and gas valves, centrifuges and new drying ovens, water distiller, proper exhaust fans, safety glasses/goggles/aprons, glassware and lab equipment (Bunsen burners, tongs, etc.), chemicals and consumables, and analytical balances.

4. Other resources

Books:

- Zumdahl, Steven S. and Susan A. Chemistry 6th Edition. Houghton Mifflin Company, 2003
- Davis, Frey, Sarquis. Modern Chemistry. Holt Rinehart and Winston, 2006.
- Chemistry Specimen Questions and Mark schemes, IBO.
- IB Questionbank – Chemistry, IBO.
- Geoffrey Neuss. Course Companion: Chemistry. Oxford University Press
- Geoffrey Neuss. IB Study Guide: Chemistry For the IB Diploma, 2014 Edition. Oxford University Press
- Catrin Brown, Mike Ford. Pearson Baccalaureate: Higher Level Chemistry – 2nd ed (USA Edition). Pearson Education
- Steve Owen, Chemistry for the IB Diploma, 2nd edition, Cambridge University Press

Databases/Websites:

- Students have access to periodicals and publications and many different databases in the Library Media Center.
- www.WebAssign.com
- EBSCOHost for online science journals
- eLibrary for online science journals

Software/resources:

- *PASCO Probeware*, Pasco Corporation (data collection software)
- *Microsoft Office*, Microsoft Corporation
- *Houghton Mifflin Student Resource CD*, Houghton Mifflin
- Videos
- Google Chromebooks

5. Links to TOK

Topic	Link with TOK (including description of lesson plan)
Topic 2 - Atomic structure	Science by its very nature lends itself to the aims of the Theory of Knowledge course. The scientific method is a process of finding answers to problems or not finding those answers and then having to start the process over again. Scientists must analyse data, make explanations, use deductive or inductive reasoning and produce theories or models to gain knowledge. There are many ways of doing this and learning about ways of knowing and other knowledge issues lends itself directly to the “understanding” of specific science issues. Students will be encouraged to discuss knowledge issues in Chemistry and will be expected to present their ideas. So many chemists from past history made very important contributions to modern chemistry without having any of the technology advances that we have today. Students will study and discuss these contributions and the implications of how they were able to make these still relevant contributions. In topic 2 atomic structure, students will discuss the idea that no subatomic particle can be or will be directly observed. They will discuss which ways of knowing are used to interpret indirect evidence, gained through the use of technology. The students will also discuss the use of models and theories. They will discuss if these models are accurate descriptions of the natural world or are they useful interpretations for explaining the natural world. The discussions will be held in a Socratic type seminar with all students expected to contribute to the discussion.

7. Approaches to learning

Topic	Contribution to the development of students' approaches to learning skills (including one or more skill category)
Internal Assessment Topics 11.1 and 11.2	The Chemistry Internal Assessment is an excellent example of developing multiple approaches to learning skills. While each student will pick his/her own topic, each will be utilizing uncertainty and error and graphical techniques in their IA write-up. ATL Category: Research Skills ATL Cluster: Information Literacy Skills ATL Skill Indicators: Access information to be informed; Make connections between various sources of information; Collect, record and verify data; Process data and report results; Create references and citations ATL Category: Self-Management ATL Cluster: Organization Skills ATL Skill Indicators: Meet deadlines; create plans for project completion

	ATL Category: Communication Skills ATL Cluster: Communication ATL Skill Indicators: Use appropriate forms of writing for different purposes and audiences; Read a variety of sources for information; Write for different purposes; Organize and depict information logically; Structure information in reports; Make inferences and draw conclusions ATL Category: Thinking Skills ATL Cluster: Critical Thinking Skills ATL Skill Indicators: Interpret data; Draw reasonable conclusions
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8. **International mindedness**

Topic	Contribution to the development of international mindedness (including resources you will use)
Topic 3 - Periodicity	International mindedness will be incorporated into Chemistry SL by having students exposed to the collaborative efforts of a worldwide scientific community leading to a deeper understanding of the importance of maintaining a global perspective. Students will study and discuss the contributions of scientists from around the world in the topic of periodicity. Students will research different scientists from around the world and will present to the class their scientist's contribution to the development of the Periodic Table.

9. **Development of the IB learner profile**

Topic	Contribution to the development of the attribute(s) of the IB learner profile
Topic 5 - Thermochemistry	Chemistry SL embodies the ideals of the Learner Profile. In the thermochemistry unit, students will be expected to inquire and show independence in learning. They will be expected to be knowledgeable about the topics they investigate and they will have to communicate their findings in a clear, accurate presentation. They will be expected to be thinkers and to be open minded if others have ideas that they may or may not agree with. Working in groups will give the students opportunities to communicate and to be principled in their work ethic. Scientists have to be risk-takers and reflective in their learning experiences. Students in Chemistry SL will be expected to embody the characteristics of the IB learner profile.