Course: Chemistry 12
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Course Length: 10 months (approx 100 hours)

Chemistry 12

Course Description
In Chemistry 12, you will develop a deeper understanding of chemical principles introduced in previous courses. The units of study include:

- Chemical Reactions and their Rates
- Chemical Equilibria
- Solubility
- Acid and Base Chemistry
- Electrochemistry

To be successful in this course a student should have strong mathematics skills and problem-solving abilities as there is an emphasis on applying mathematics to solving problems. Chemistry 12 often serves as a prerequisite for further studies in sciences.

How will your mark be calculated?

Assignments	30%
Labs	10%
Unit Tests	50%
Final Exam	10%

Resources
The text used in this course is Hebden: Chemistry 12 Workbook for Students. This text is very useful and will help you gain confidence with the material in this course. You can pick it up anytime during our office opening hours.

Please download and print a copy of the data booklet provided as a resource in this introductory section. It is important that you learn how to use the information presented in this booklet.

The Course Timeline is a resource that can be used as you work through each unit to ensure you have a sound understanding of the material covered.

You may also want to visit the BC government Education website below which may help you prepare for unit tests and the final exam.

http://www.bced.gov.bc.ca/exams/

Students are expected to:

- Contact the teacher by instant messaging or email when help is needed or questions arise.
- Be actively engaged and submitting work on a regular basis.
- Inform the teacher when they will be inactive for two or more weeks.
- Be aware that if they are inactive in a course for four or more weeks they may be removed from that course.
- Check their email at least twice a week.
- Create and submit completed solutions for all activities in the unit/chapter before requesting a test.
- Cite all sources properly.
- Answer in your own words.
- Check that their work and tests have been marked.
- Make time available to come in to Burnaby Online to write tests.
- Make appointments to write tests at least 2 school days in advance.

Communication

Communication is key to success in this course. Please be sure to contact your instructor by email or phone anytime a problem arises. We hope you achieve great success in this course. You will be required to complete all assignments and submit them to be marked. When completing each assignment remember to show a good level of understanding of the material covered.
All tests and exams will be written at the Burnaby Online centre.

Course Learning Activities

UNIT	SECTION	COMPLETED
Review Unit	Moles and Molarity Review Assignment	
	Stoichiometry Review Assignment	
Unit 1 Reaction Rates	1.1: Math in Science (Review)	
	1.2: Reaction Kinetics Big Ideas & Curriculum Topics	
	1.3: Reaction Rates	
	1.4: Collision Theory & Heat of Reaction	
	1.5: Kinetic Energy & Reaction Mechanisms	
	Unit 1.1 Assignment	
	Unit 1.2 Assignment	
	Unit 1.3 Assignment	
	Lab 1.1 Assignment	
	Lab 1.2 Assignment	
	Unit 1 Practice Exam	
	Unit 1 Test	
Unit 2 Equilibrium	2.1: Equilibrium	
	2.2: The Equilibrium Law	
	Unit 2.1 Assignment	
	Unit 2.2 Assignment	
	Unit 2.3 Assignment	
	Unit 2.4 Assignment	
	Lab 2.1 Assignment	
	Unit 2 Practice Exam	
	Unit 2 Test	
Unit 3 Solubility	3.1: Solubility	
	3.2: Saturated Solutions	
	3.3: Ions	
	Unit 3.1 Assignment	
	Unit 3.2 Assignment	
	Unit 3.3 Assignment	
	Unit 3.4 Assignment	
	Unit 3.5 Assignment	
	Lab 3.1 Assignment	
	Lab 3.2 Assignment	
	Unit 3 Practice Exam	
	Unit 3 Test	
Midterm	Midterm Exam	
Unit 4 Acid & Bases	4.1: Acids and Bases	
	4.2: Strength of Acids and Bases	
	4.3: Calculations	
	4.4: More about Acids and Bases	
	4.5: Titration	
	Unit 4.1 Assignment	

	Unit 4.2 Assignment	
	Unit 4.3 Assignment	
	Unit 4.4 Assignment	
	Unit 4.5 Assignment	
	Unit 4.6 Assignment	
	Unit 4.7 Assignment	
	Unit 4.8 Assignment	
	Unit 4.9 Assignment	
	Lab 4.1 Assignment	
	Unit 4 - Part 1 - Practice Exam	
	Unit 4 - Part 2 - Practice Exam	
	Unit 4 Test	
Unit 5 Redox Reactions	5.1: Electrochemistry	
	5.2: The Standard Reduction Table	
	5.3: Balancing Reactions	
	5.4: The Electrochemical Cell	
	5.5: Electrolytic Cells	
	Unit 5.1 Assignment	
	Unit 5.2 Assignment	
	Unit 5.3 Assignment	
	Unit 5.4 Assignment	
	Unit 5 Practice Exam	
	Unit 5 Test	
Final	Final Exam	

B.C. Curriculum

The B.C. Ministry of Education Chemistry 12 Curriculum Guide is built around 5 Core Big Ideas:

BIG IDEAS

Reactants must collide to react, and the **reaction rate** is dependent on the surrounding conditions.	**Dynamic equilibrium** can be shifted by changes to the surrounding conditions.	**Saturated solutions** are systems in equilibrium.	**Acid or base strength** depends on the degree of ion dissociation.	**Oxidation and reduction** are complementary processes that involve the gain or loss of electrons.

Learning Standards

- **reaction rate:**
  - heterogeneous and homogeneous reactions
  - factors that affect reaction rate
  - controlling reaction rate
- **collision theory:**
  - collision geometry
  - relationship between successful collisions and reaction rate
  - relationship of activated complex, reaction intermediates, and activation energy to PE diagrams
- **energy change:** relationship between PE, KE, enthalpy (ΔH), and catalysis
- **reaction mechanism:**
  - relationship of the overall reaction to a series of steps (collisions)
  - rate-determining step
- **catalysts:** applications (e.g., platinum in automobile catalytic converters, catalysis in the body, chlorine from CFCs in ozone depletion)
- **dynamic nature of chemical equilibrium:** reversible nature of reactions, relationship to PE diagram
- **Le Châtelier's principle and equilibrium shift:**
  - concentrations of reactants and products
  - enthalpy and entropy
  - presence of a catalyst
  - applications (e.g., Haber process, hemoglobin and oxygen in the blood)
- **equilibrium constant (K_{eq}):**
  - homogeneous and heterogeneous systems
  - pure solids and liquids
  - effect of changes in temperature, pressure, concentration, surface area, and a catalyst
- **solubility product (K_{sp}):** K_{sp} as a specialized K_{eq} expression
- **relative strength:**
  - electrical conductivity
  - table of relative acid strength
  - equations of strong and weak acids and bases in water
- **weak acids and weak bases:** equilibrium systems
- **titration:** the method to find an equivalence point:
  - strong acid–strong base titration
  - weak acid–strong base titration
  - strong acid–weak base titration
- **hydrolysis of ions in salt solutions:**
  - acidic, basic, or neutral salt solutions
  - amphiprotic ions
- **applications of acid-base reactions:**
  - non-metal and metal oxides in water and associated environmental impacts
  - buffers
- **the oxidation-reduction process:**
  - oxidation number
  - balancing redox reactions
- **electrochemical cells:** half-reactions, cell voltage (E^0), applications (e.g., lead-acid storage batteries, alkali cells, hydrogen-oxygen fuel cells)

- **electrolytic cells:** half-reactions, minimum voltage to operate, applications including metal refining (e.g. zinc, aluminum), preventing metal corrosion (cathodic protection)
- **quantitative relationships:** quantitative problems using relationships between variables such as:
  - in equilibrium systems (e.g., K_{eq}, initial concentrations, equilibrium concentrations)
  - in solutions (e.g., K_{sp}, prediction of precipitate formation, calculating the maximum allowable concentration)
  - in water as an equilibrium system (e.g., K_w, $[H_3O^+]$ or $[OH^-]$, pH and pOH)
  - in acid-base systems (e.g., K_a, K_b, $[H_3O^+]$, $[OH^-]$, pH and pOH)
  - in a titration (e.g., pH of a solution, K_a of an indicator)
  - pH in hydrolysis of ions in salt solutions
  - in a redox titration (e.g., grams, moles, molarity)
  - in an electrochemical cell (e.g., E^0)