Course Overview and Expectations

Introduction – when you completed Chemistry 11 you completed a general chemistry course. This course should have made you comfortable with handling numbers, the physical properties of matter, naming compounds, balance chemical equations, know the types of reactions, stoichiometry, the structure of the atom, the periodic table, chemical bonding, solution chemistry, molar concentrations, and finally organic chemistry. By its very nature, since it was a general course, your learning moved all over the place and just when you found something that might interest you (or something you could understand), your teacher had moved onto another topic. Chemistry 11 was a building block for Chemistry 12. **Most scientists today study and use all three science** – physics, chemistry, and biology in the pursuit of knowledge. From such knowledge comes all the things that we take for granted; microwaves, video games, movies, medicines, smart phones, the vast variety of foods, huge supplies of energy, and the understanding that if we don't take care of the earth, there will be some serious consequences for the human race. This course is designed to give you deeper insight into chemistry and help you to further your understanding of physics and biology. It will involve a lot of lab work, experiments, and all that!

The scientific method of inquiry that you were introduced to in your early schooling is just one way in which we ask questions and try to get answers about all kinds of things. The questions that we ask are often tested by experimentation. Therefore, there is an emphasis on lab work during this course (time allowing). This is balanced by an equal emphasis on your ability to learn, use creative thinking, and be critical! You need to acquire a basic set of knowledge and skills that will help you towards understanding the basic science called chemistry and, in this course, to go beyond the basics and start to study this subject more in-depth.

Unit	Description	Time (classes)
0	Review of Chemistry 11	5
1	Reaction Kinetics	9
2	Reaction Equilibrium	11
3	Solubility Chemistry	10
4	Acids/Base Reactions	28
5	Electrochemistry	20

*Note – the times listed are approximate based on the amount needed in previous years.

Materials Needed for Chemistry 12

1. 3-ring binder with lined paper.
2. Pencil. You can write in pen for notes that don't involve calculations, graphs, or diagrams if you choose.
3. Scientific calculator (capable of 10^x, logs, 1/x, cube roots, etc.). This is a very math dependant course.
4. Good attitude and work ethic.

Course Outline

Evaluation Procedure

Students will be evaluated using the following approximate criteria;

Term marks:

Tests and Quizzes	approximately 70%
Practice work, projects, Activities, and labs	approximately 30%

Final Mark:

Course mark	80%
Final exam	20%

Marking percentages for Chemistry 12:

The percentages for Chemistry 12 will follow the provincial guidelines

A	-	$86 - 100\%$
B	-	$73 - 85\%$
C+	-	$67 - 72\%$
C	-	$60 - 66\%$
Pass	-	$50 - 59\%$
Fail	-	$0 - 49\%$

"Extra" credit in not routinely assigned during the course. However, the interested student may report on special topics in chemistry of his/her choice for extra credit. Id o not assign a set number of "marks" for this work. If the student is at a "borderline" between letter grades and has done some extra work, then the higher mark may be awarded.

Course Outcomes

By the end of the course the goal is you are able to . . .

- Use the scientific method with proper controls and variable, work in the lab, define matter and its properties, distinguish between observation and interpretation, use basic SI units, scientific notation and significant figures for quantitative chemistry. This is Chemistry 11 stuff and only reviewed briefly.
- Demonstrate your knowledge and understanding of the nature of chemical reactions in terms of speed and the factors which affect this such as temperature, concentration, surface area, kinetic energy, activation energy, catalysts, enthalpy, and the like.
- Understanding and describing the reversible nature of chemical reactions on a potential energy diagram, know and understand the concept of dynamic equilibrium in terms of concentrations of reactants and products, infer from data that systems move towards a position of minimum enthalpy and maximum entropy and explain shifts in equilibrium caused by temperature, concentration, partial pressure, and volume changes; predict the position of equilibrium when enthalpy and entropy favour the products, when they favour the reactants and when these two actually oppose each other, understand Le Chatelier's Principle and the factors that affect it and its commercial and industrial application.
- Use chemical formula to distinguish between ionic and covalent solutions and describe solubility in terms of equilibrium, write net ionic equations, complete ionic equations, describe compounds having a high or low solubility, calculate the concentration of positive and negative ions of a solute in an aqueous solution, use solubility charts to predict precipitation and solubility of ions, be able to classify K_{sp} as a specialised K expression, and predict qualitative changes in the equilibrium and solubility of a compound by addition of common ion or a soluble salt.
- Identify the general properties of acids and bases via experimentation, define Bronsted-Lowry acids and bases, identify a hydronium ion as a protonated water molecule, write balanced equations representing neutralizations, identify amphiprotic substances, define conjugate pairs, write and name formulas of common acids/bases; classify, predict acids and bases as being strong or weak in terms of conductivity, understand dissociation constants for weak and strong acids and bases; write K_w, K_a, K_b expressions; learn to use the pH and pOH scales; use data and calculations from titrations to find concentrations of acids and bases, use appropriate indicators for titrations and relate the functions of indicators to both strong and weak acids and bases, and understand the terms endpoint or transition point; understand and prepare buffer solutions, explain buffer equilibrium shifts as small quantities of acid or bases are added to the buffer; know some industrial applications of buffers, describe acid rain and its problems and implications in economic, political, environmental, and social contexts.
- Learn to identify redox reactions, oxidation, reduction, oxidizing and reducing agents, write half reactions, and predict using a half reaction table if a reaction will occur or not, and write balanced equations; describe

the arbitrary nature of oxidation numbers, determine changes in oxidation numbers when an atom undergoes oxidation or reduction, balance net ionic redox reactions, do redox titrations; construct an electrochemical cell, identify the products at the cathode and anode, assign voltages to the oxidizing and reducing agents present in the electrochemical cell; describe the significance of $E°$ of a cell; describe the functioning of lead acid batteries, alkaline acid batteries, and fuel cells; define electrolysis, the electrolytic cell, the electrolysis of a binary salt, the electrolysis of sodium iodide; the process of corrosion, its prevention; demonstrate how the breath alcohol content is measured by a breathalyzer and write balanced redox equations to describe the function of a breathalyzer.

General Recommendations for Success

Chemistry 12 is a preparatory course for university. I'm sure you have heard stories of Chemistry 12. Some may even be true. For success in this course you will need to work at a very high level of commitment! For whatever treason you have chosen to take this course and therefore my assumption is that you will be dedicated to the task of achieving the best mark possible.

1. **This course is an option**. You must work to the best of your ability.
2. **Make sure Chemistry 12 is realistic for you.** You must have a good working knowledge of introductory chemistry as well as a good working knowledge of algebra. I will not be able to "catch you up" on sloppy work habits and poor understanding of earlier chemistry and math knowledge.
3. **Review everyday**. 10-15 minutes of review, not including practice work, is crucial for long term remembrance and understanding.
4. **Attendance is mandatory**. We all know what is an acceptable absence. In a semester timetable the course will happen quickly. Everyday of absence is a significant loss to your personal education and your knowledge and understanding of chemistry. Even a few days missed to illness can result in being to far behind to catch up. You MUST have a classmate/friend tell you what you missed and try to keep up. My website is an excellent resource of sheets and practice work. The address is www.calebwilkison.weebly.com. The password is science rules.

   If your having difficulties with the material, I am available before school for extra help. I will not pressure students to come for help, but I want you to be aware that this opportunity exists.
5. **Due dates are rigid**. Assignments are generally due at the beginning of class. Handing in late is an indication that you are falling behind. This is a very slippery slope. Don't allow this to begin to happen.
6. **Contact**

   I am available for questions and concerns. Please contact me through e-mail at Caleb.Wilkison@sd23.bc.ca.