Chemistry 30 Course Work Plan

Units/Topics	Time Frame	Major Learning Outcomes Unit	Major Resource(s) Assessment methods
Unit 1 **Review of Basic Principles**	**2 – 3 weeks** **Sept.**	• **Identify protons, neutrons, and electrons as components of an atom.** • **Calculate atomic mass (atomic weight) values when given the percentage of each isotope of an element.** • **Use the periodic table.** • **Write the formula of a compound, given its name.** • **Write the name of a compound, given the formula.** • **Use a table of atomic mass units (atomic weights) to determine the formula weight (molecular weight, molecular mass, molar mass) of chemical compounds.** • **Balance chemical equations for mass and for charge.** • **Describe the physical properties of ionic, metallic, and covalent (molecular), and van der Waal's solids.**	**Resources:** Teacher-made resources to review materials from chemistry 20 Newfoundland Distance learning – www.cdli.ca **Textbook:** McGraw-Hill Ryerson Chemistry **Informal assessments:** Written assessments Homework assignments **Formal assessments:** Unit test upon completion of unit
Unit 2 **Thermodynamics** **(Energy Changes in Chemical Reactions)**	**2 – 3 weeks** **Sept. – Oct.**	• Recognize that energy changes are associated with chemical reactions. • Relate enthalpy change in a reaction to bond energy and stability. • Differentiate between endothermic and exothermic reactions.	**Resources:** Teacher-made resources Saskatchewan Learning - http://staff.prairiesouth.ca/~chemistry/chem30/

		• Compare the energy changes in phases changes and chemical reactions. • Explain the difference between heat and temperature. • Identify reactions which are used to produce useful heat. • Consider the environmental and social effects of the use of heat energy by our society. • Measure some energy changes in chemical reactions. • Investigate how tables of standard heats (enthalpies) of formation are created and used. • Express the enthalpy change of chemical reactions as a term in the equation for the reaction, or as a heat of reaction (ΔH). • Use tables, graphs, or diagrams and an application of Hess's Law to infer enthalpy changes in reactions.	Newfoundland Distance learning – www.cdli.ca **Textbook:** McGraw-Hill Ryerson Chemistry **Informal assessments:** Homework assignments **Formal assessments:** Written assessments Lab activities Unit test upon completion of unit
Unit 3 **Chemical Kinetics**	**2-3 weeks** **Oct.**	• Suggest some ways in which the rate of a chemical reaction could be measured. • Identify some factors which affect the rate of chemical reactions. • Apply collision theory to account for the factors which affect the rates of chemical reactions. • Recognize that chemical reactions may occur in successive elementary steps. • Understand how a series of simple reactions can constitute a reaction mechanism for a complex reaction. • Discuss the concept of threshold energy. • Interpret energy versus reaction pathway diagrams.	**Resources:** Teacher-made resources Saskatchewan Learning - http://staff.prairiesouth.ca/~chemistry/chem30/ Newfoundland Distance learning – www.cdli.ca

		• Consider the existence of transition states in which activated complexes exist. • Explain the role of catalysts in chemical reactions. • Interpret energy versus reaction pathway diagrams for catalyzed and uncatalyzed reactions. • Describe the use of catalysts in a variety of applications.	**Textbook:** McGraw-Hill Ryerson Chemistry **Informal assessments:** Homework assignments **Formal assessments:** Written assessments Lab activities Unit test upon completion of unit
Unit 4 **Equilibrium**	**2 – 3 week** **Oct. - Nov.**	• Observe and describe some reactions which are easily reversible and some which are not easily reversible. • Consider the implications for a system when the rates of the forward and the reverse reactions that define the system are equal. • Discuss non-chemical analogies which illustrate or simulate equilibria. • Distinguish between dynamic equilibria and steady-state processes. • Discuss the influence of free energy on the spontaneity of reactions. • Understand why Le Chatelier's principle works. • Use Le Chatelier's principle to predict how various equilibrium systems will shift in response to external stress. • Discuss industrial applications of Le Chatelier's principle.	**Resources:** Teacher-made resources Saskatchewan Learning - http://staff.prairiesouth.ca/~chemistry/chem30/ Newfoundland Distance learning – www.cdli.ca **Textbook:** McGraw-Hill Ryerson Chemistry

		• Write he equilibrium constant expression for a chemical reaction using the general equation: $aA_{(aq)} + bB_{(aq)} \rightleftharpoons cC_{(g)} + dD_{(aq)}$ • Recognize that K_{eq} values are dependent upon temperature but are independent of concentration. • Analyze graphs of the concentrations of reactants and products with respect to time in a chemical reaction which is approaching equilibrium. • Interpret K_{eq} values to determine whether products or reactants are favoured once equilibrium has been reached. • Solve problems involving the equilibrium constant expression for a chemical reaction, with concentrations expressed in mol·litre and kPa.	**Informal assessments:** Homework assignments **Formal assessments:** Written assessments Lab activities Unit test upon completion of unit
Unit 5 **Solubility and Solutions**	**2 – 3 weeks** **Nov.**	• Express the concentration of a solution in moles of solute per litre of solution (M, moles·litre or mols·L). • Manipulate the relationship which links the mass of solute, volume of solution and concentration of solution so that given two, the other can be determined. • Describe how to prepare standard solutions and serial dilutions in the laboratory. • Manipulate the relationship which links original concentration, volume of diluent and concentration of diluted solution so that given two, the other may be determined. • Relate concentrations expressed as ppm or ppb to those expressed as mols·L or g·L • Use solubility charts to determine the solubility of various substances. • Describe how to perform tests on solutions to determine which ions or ion groups are present.	**Resources:** Teacher-made resources Saskatchewan Learning - http://staff.prairiesouth.ca/~chemistry/chem30/ Newfoundland Distance learning – www.cdli.ca **Textbook:** McGraw-Hill Ryerson Chemistry **Informal assessments:** Homework assignments

		• Describe how to separate ions in solution by selective precipitation. • Describe how the common ion effect influences the solubility of a solute in a solution. • Investigate the application of the principles of solubility. • Read and interpret solubility charts and tables	**Formal assessments:** Written assessments Lab activities Unit test upon completion of unit
Unit 6 **Acids and Bases**	**2-3 weeks** **Nov. – Dec.**	• Identify some acids and some bases which are used in common household products. • Observe some physical and chemical characteristics of acids and bases. • Construct an operational definition of an acid and a base, using the characteristic properties of those substances. • Describe the Brønsted-Lowry conceptual definition of acids and bases. • Identify the conjugate bases formed in acid dissociation. • Associate acid or base strength with magnitudes of K_a and K_b. • Identify the conjugate acid of any base. • Recognize substances which are amphiprotic (amphoteric). • Compare the strengths of the dissociations in the dissociation series for a polyprotic acid. • Investigate the nature of the production and use of • acids and bases in our society. • Write the equilibrium constant expression for the dissociation of water. • Show how the common ion effect influences the equilibrium of water's dissociation when H+ ions or OH - ions are added to water. • Recognize the relationship between the [H+] and [OH)]	**Resources:** Teacher-made resources Saskatchewan Learning - http://staff.prairiesouth.ca/~chemistry/chem30/ Newfoundland Distance learning – www.cdli.ca **Textbook:** McGraw-Hill Ryerson Chemistry **Informal assessments:** Homework assignments **Formal assessments:** Written assessments

		in an aqueous system. • Calculate the [H+] in a solution. • Express the [H+] as a pH value. • Explain how a logarithmic scale differs from an arithmetic scale. Estimate the pH of solutions, using indicator solutions and indicator papers. • State the general neutralization equation: acid + base 6 salt + water • Write equations for specific neutralization reactions, identifying the nature of each species. • Solve mathematical problems involving data from titrations. • Develop skill in doing titrations. • Read and interpret the scales on buret tubes. • Discuss with peers how estimates of values are made. • Use information from Ka tables to calculate pH values in solutions and check results of calculations with indicators.	Lab activities Unit test upon completion of unit
Unit 7 **Electrochemistry** **(Oxidation and Reduction)**	**2 – 3 weeks** **Dec. – Jan.**	• Define oxidation and reduction in terms of transfer of electrons. • Develop a reduction potential series based on experimental results. • Write half reactions and net ionic equations involving oxidation-reduction processes. • Use a table to compare reduction potentials of half-reactions. • Describe the processes of corrosion and metallic deposition, using the terms oxidizing agent, reducing agent, oxidized species, and reduced species. • Identify and investigate means of protecting metals against corrosion. • Describe the conditions under which automobiles corrode most quickly. • Determine the direction of electron flow in an electrochemical cell.	**Resources:** Teacher-made resources Saskatchewan Learning - http://staff.prairiesouth.ca/~chemistry/chem30/ Newfoundland Distance learning – www.cdli.ca **Textbook:** McGraw-Hill Ryerson Chemistry

		• Measure the voltage in several electrochemical cells. • Calculate the potential difference in volts of electrochemical cells, using a standard reduction potential table. • Explain the difference between a standard potential and an observed potential. • Compare electrochemical and electrolytic cells. • Examine applications of electrochemistry. • Understand and use the vocabulary, structure and forms of expression which characterize the study of oxidation-reduction reactions.	**Informal assessments:** Homework assignments **Formal assessments:** Written assessments Lab activities Unit test upon completion of unit
Laboratory Activities **Independent Research**	**Integrated within units 1-7**	• Develop abilities to meet own learning needs. • Understand the uses and abuses of mathematical concepts in everyday life. • Participate in scientific inquiry. • Focus attention on knowledge and gaps in personal knowledge related to a specific topic • Write proposals for individual or group projects, including such things as: a completion date, criteria for assessment, resources to be accessed, preferred method of presentation, suggested audiences for presentation, and meeting dates for review and collaboration. • Take responsibility for their own learning by setting goals, designing plans, developing proposals, suggesting baseline performance levels, organizing allotted time, managing activities, evaluating success, and reviewing the entire process. • Demonstrate ability to access information from a variety of resources.	**Resources:** Teacher-made resources Saskatchewan Learning - http://staff.prairiesouth.ca/~chemistry/chem30/ Newfoundland Distance learning – www.cdli.ca **Textbook:** McGraw-Hill Ryerson Chemistry **Informal assessments:** Homework assignments Lab activities