Crosslake Community School
ONLINE PROGRAM

Chemistry B

Crosslake Community High School

INSTRUCTOR

Scott Hetherington
scotthetherington@crosslakekids.org

Office Hours: I am online 11 AM to 3 PM, but I check back often in the afternoon and evening.

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COURSE DESCRIPTION

Chemistry - Semester B is the second part of a two-semester, full-year course structured around the Minnesota 9th - 12th grade science standards. Chemistry - Semester B builds on the fundamentals taught in semester A while continuing to introduce new chemistry concepts. This course also utilizes the on-line “Edgenuity” learning management system to present chemistry concepts in relevant, real world situations. The second semester of this course continues to require application of basic mathematical calculations while digging deeper into introductory chemistry and scientific analysis. The course outline below shows topics covered in Chemistry - Semester B.

PREREQUISITES

It is very helpful if students have passed an Algebra I class and an introductory Physical Science class before taking this Chemistry class, but it is not required. Students with a better understanding of basic Algebra will be more prepared for some of basic calculations

required in the course. Students with understanding of introductory atomic level science will be more prepared for some of the concepts discussed in the class.

COURSE GOALS & OBJECTIVES

- State Boyle's law, Charles's law, and Gay-Lussac's law, and apply these laws to calculate the relationships among volume, temperature, and pressure.
- Derive the combined gas law from Boyle's law, Charles's law, and Gay-Lussac's law.
- Define partial pressure.
- Apply Dalton's law of partial pressures to describe the composition of gases.
- Explain how Avogadro's law, or principle, can be combined with other gas laws to describe the relationships among pressure, temperature, volume, and number of moles of a gas.
- State the ideal gas law, which relates pressure, temperature, and volume of an ideal gas.
- Solve problems using the ideal gas law.
- Differentiate among the various forms of energy, including kinetic energy, potential energy, chemical energy, and thermal energy.
- Explain that energy can be transformed from one form to another.
- Describe the law of conservation of energy.
- Relate temperature to the average molecular kinetic energy.
- Describe heat flow in terms of the motion of atoms or molecules.
- Distinguish between exothermic chemical processes and endothermic chemical processes.
- Differentiate between heat capacity and specific heat.
- Solve problems involving heat flow and temperature changes to calculate the specific heat of a substance.
- Define calorimetry and explain how calorimeters work.
- Use calorimetry to calculate the heat of a chemical process.
- Understand the use of enthalpy in thermochemistry.
- Use thermochemical equations to calculate energy changes (i.e., enthalpy changes) that occur in a chemical reaction.
- Use thermochemical equations to calculate energy changes (i.e., enthalpy changes) that occur in a combustion reaction.
- Interpret reaction pathways.
- Use reaction pathway graphs to identify exothermic and endothermic reactions.
- Define and explain the role of the activation energy in a chemical reaction.
- Describe heterogeneous mixtures, including suspensions and colloids.
- Describe homogeneous mixtures, such as solutions.
- Identify the components of a solution.
- Identify nonaqueous solutions.

- Identify factors affecting the rate at which a substance dissolves.
- Define solubility and differentiate between saturated, supersaturated, and unsaturated solutions.
- Investigate factors that influence solubility.
- Identify the limiting and excess reactants for a given reaction.
- Use the limiting reactant to predict the theoretical yield of a reaction.
- Calculate the percent yield of a reaction.
- Define concentration.
- Calculate the concentration of solutions in units of molarity.
- Solve stoichiometry problems involving molarity.
- Use molarity to calculate dilutions of solutions.
- Calculate the concentration of a solution in terms of molality.
- Calculate the concentration of a solution in grams per liter, parts per million, and percent concentration.
- Explain the concept of reaction rate.
- Describe collision theory and how it is related to reactions.
- Explain how various factors, including concentration, temperature, and pressure, affect the rate of a chemical reaction.
- Explain the role that a catalyst plays in increasing reaction rate.
- Compare homogeneous and heterogeneous catalysts.
- Explain what a reaction mechanism is and what intermediates are in a reaction mechanism.
- Define rate-determining step, and identify the rate-determining step in a reaction pathway.
- Write the rate law for a reaction pathway.
- Explain dynamic equilibrium.
- Write equilibrium expressions, and use them to calculate the equilibrium constant for reactions.
- Use Le Chatelier’s principle to predict shifts in equilibrium caused by changes in pressure, concentration, and temperature.
- Use Le Chatelier’s principle to predict shifts in equilibrium caused by the addition of a common ion to the system.
- Describe applications of acids and bases.
- Describe the Arrhenius definitions of acids and bases.
- Describe the Bronsted-Lowry definitions of acids and bases.
- Identify conjugate acids and conjugate bases in a Bronsted-Lowry acid-base reaction.
- Describe the Lewis definitions of acids and bases.
- Predict the products of acid-base neutralization reactions.
- Write equations and net ionic equations for neutralization reactions.
- Explain how protons and neutrons in the nucleus are held together by nuclear forces.
- Differentiate chemical and nuclear reactions in terms of energy released.

- Explain why Einstein's equation $E = mc^2$ is used to determine the nuclear binding energy.
- Identify some naturally occurring isotopes of elements that are radioactive.
- Differentiate between chemical reactions and nuclear reactions.
- Identify types of radioactive decay.
- Describe what a half-life is.
- Calculate the amount of a radioactive substance remaining after an integral number of half-lives have passed.
- Calculate the number of half-lives that have passed given mass data for the radioactive substance.
- Explain and compare fission and fusion reactions.
- Relate the role of nuclear fusion to the production of essentially all elements heavier than helium.
- Describe how nuclear power plants work.
- Describe the issues surrounding nuclear waste.
- Explain that alpha, beta, and gamma radiation produce different amounts and kinds of damage in matter and describe the effects of each kind of radiation on living things.
- Describe how radiation is measured and detected.
- Describe applications of radiation.
- Describe carbon's unique bonding characteristics that make the diversity of carbon compounds possible.
- Read and draw structural formulas of organic compounds.
- Explain the difference between structural isomers and geometric isomers.
- Describe the properties of straight-chain alkanes, branched-chain alkanes, and cycloalkanes.
- Use the system for naming the ten simplest linear hydrocarbons and isomers that contain single bonds.
- Identify uses of saturated hydrocarbons.
- Describe the properties of alkenes, alkynes, and aromatic hydrocarbons.
- Use the system for naming the ten simplest linear hydrocarbons and isomers that contain double bonds, triple bonds, and benzene rings.
- Identify uses of unsaturated hydrocarbons including uses in pharmaceuticals, petrochemicals, plastics, and food.
- Identify the functional groups that form the basis of alcohols, ketones, ethers, amines, esters, aldehydes, and organic acids.
- Describe uses and natural occurrences of compounds containing functional groups.

REQUIRED MATERIALS

Students will need: Daily access to computer or laptop with working internet access; notebook paper for notes and calculations;writing utensils; calculator; optional for hands-on

lab activities: simple science supplies (kitchen chemistry type materials).

TECHNICAL REQUIREMENTS

Students will need to be able to create, save, modify, and submit documents including using programs such as Microsoft Office or Google Docs. If the student submits an assignment in a format that is un-openable by the instructor, that assignment will need to be re-submitted in one of the common formats. Students will need daily internet access and intermediate understanding of how to use email. Students must use their assigned Crosslake email.

TEACHER CONTACT & COMMUNICATION

Regular communication is critical to your success in this class. It is important that as soon as you have a question you cannot answer, that you reach out to me or your Learning Coach. Or, if I contact you, that you respond quickly so you can get the most out of this course..

Feedback

I will grade assignments regularly, usually within 2 school days, and provide feedback to you on these assignments. Read through the feedback and ask clarifying questions, since I write these comments to help you improve your learning in this course.

Office hours

I will be available to answer questions and help work through assignments during the common hours posted at the top of this syllabus. This is a great time to contact me since I will usually be able to get back to you very quickly.
I will return all communications within 24 hours.

Additional support

If you need additional academic support beyond regular feedback and communication with me, please let me or your Learning Coach know so that we can connect you with appropriate help.

COURSE POLICIES

Attendance/Participation Policy

Attendance and participation are based on daily logins to the course and regular completion of assignments. To stay on track, you should follow the due dates for activities and assignments listed in the syllabus or learning management system. For more specific information about attendance, including excused/unexcused absences, see the Crosslake Community High School Parent/Student Course Handbook

Missing or Late Work

All work is due at the end of the semester. However, if a student waits until the last week or two to complete the coursework, it is unlikely that he or she will earn a passing grade. To help you plan and manage time, I have created a course schedule included in the syllabus. Missing work at the end of the semester will be counted as 0 points.

Questions

Please ask questions as soon as you have them; if you aren't clear on a concept, it is likely that others have the same question. The sooner you ask a question, the sooner I can help you!

Academic integrity

Do not copy someone else's work and present it as your own; do not plagiarize something from the internet; do not take credit for someone else's work; and do not allow anyone copy your work. Possible consequences for cheating in this class: Reduced assignment or test scores; no credit earned; meeting with parents, student, and administration; possible course failure and delayed graduation.

COURSE ACTIVITIES

Activity type	Attempts		% of final grade
Quizzes	2		20%
Tests	2		30%
Exams	2		20%
Assignments			10%
Labs			20%
TOTAL			**100%**

COURSE OUTLINE & SCHEDULE: 4.3 hours per week

(This is a guideline based on students starting at the beginning of the semester. Students starting later in the term will have a different schedule. Look at your course management system for the current due dates.)

Week	Start Day	Unit	Assignments Due

1		Gas Laws	• Gas Laws • Lab: Charles's Law
2			• Lab: Boyle's Law • The Ideal Gas Law
3		Energy and Chemical Reactions	• Energy • Heat • Calorimetry
4			• Lab: Calorimetry and Specific Heat • Thermochemical Equations
5		Stoichiometry and Solutions	• Reaction Pathways • Unit Test • Mixtures and Solutions
6			• Solutions and Solubility • Lab: Solubility • Limiting Reactant and Percent Yield
7			• Measures of Concentration: Molarity • Measures of Concentration: Molality and Other Calculations • Unit Test
8		Kinetics, Equilibrium, and Acids & Bases	• Reaction Rates • Lab: Reaction Rate • Catalysts
9			• Reaction Mechanism and Rate-Determining Step • Reversible Reactions and Equilibrium • Shifts in Equilibrium • Properties of Acids and Bases
10		Nuclear Chemistry	• Arrhenius, Bronsted-Lowry, and Lewis Acids and Bases • Neutralization Reactions • Unit Test • The Nucleus
11			• Types of Radioactive Decay • Half-Life • Lab: Half-Life

12			• Nuclear Fission and Nuclear Fusion • Nuclear Energy • Nuclear Radiation
13		Organic Chemistry	• Unit Test • Organic Compounds • Properties and Uses of Saturated Hydrocarbons
14			• Properties and Uses of Unsaturated Hydrocarbons • Functional Groups
15			• Unit Test • **Cumulative Exam**

Supplemental Student Communication

Progress Reporting

CCHS staff will submit progress reports to the local school contact person upon completion of the student's academic term. The student and family may access regular progress reports in the online learning platform through the student gradebook anytime.

Final Grades and Submissions

Semester and final grades are submitted to the school counselor within 10 days of the end of the semester. Successfully completed CCHS courses are worth .5 semester credits; credit conversions and graduation requirements do differ between school districts. Contact your school counselor for your local district's graduation requirements and credit conversion.