



Ephrata High School  
Course Syllabus

Honors Chemistry 2  
4216



### *I. Course Description*

**Honors Chemistry 2**

**1 Credit**

**Grade 12**

*Course Level: Level 2*

*Prerequisite: B or better in Foundations of Chemistry, and B or better in Algebra 2*

Honors Chemistry 2 is an intensive course for the interested student who has successfully completed Foundations of Chemistry with a B or higher. Topics of study will include quantitative analysis techniques (including water and soil quality environmental studies), thermochemistry, reaction kinetics, gas and solution equilibria, advanced acid-base concepts, nuclear chemistry, electrochemistry, and organic chemistry. Heavy emphasis is placed on laboratory work, mathematical concepts, and critical thinking skills. This course will have a research project component. This course is designed for students expecting to encounter a college-level chemistry course in the future and is highly recommended for students entering college who are planning to major in chemistry or a chemistry-related field. Students should be taking at least Algebra 3 or Pre-Calculus concurrently.

### *II. Materials & Equipment*

Text: Zumdahl, S.S. and S.A. Zumdahl. *Chemistry, Seventh Edition*. Houghton Mifflin Company. Boston, 2007.

Materials: scientific calculator with logarithmic functions and scientific notation capabilities (TI-83 or higher is recommended, but not required); 3-ring binder; lab equipment and chemicals.

### *III. Course Goals & Objectives*

- Students will learn environmental sampling techniques as they apply to type of analysis, sampling bias, timing of sampling, and preserving analyte validity.
- Students will learn several ways to calculate concentrations of analytes in a solution.
- Students will learn how to prepare solutions of a specific concentration using various techniques.
- Students will learn how to investigate actual water and soil samples for concentrations of particular analytes using various assay techniques.
- Students will learn about heat transfer and its implications on other areas of chemistry.
- Students will use the Kinetic Molecular Theory to describe mechanisms by which reactions occur.

- Students will construct and interpret data graphs as means of understanding the effect certain factors have on reaction rate.
- Students will be able to calculate and understand the meaning and use of equilibrium constants.
- Students will understand the characteristics of the equilibrium state and the application of LeChatlier's Principle.
- Students will be able to apply equilibrium principles to acid-base systems and understand the meaning and use of  $K_a$  and  $K_b$  as they relate to acid-base equilibria.
- Students will recognize the importance of oxidation-reduction concepts as they apply to all aspects of chemistry.
- Students will understand the significance and use of electrochemical cells.
- Students will learn basic organic nomenclature and rudimentary organic reactions.
- Students will become aware of the range of information resources available in the area of chemistry, and be able to find, retrieve and critically evaluate information from these resources.

#### IV. Course Topics (Summary Outline)

- *Quantitative Analysis:* units of concentration, quantitative analysis, spectrophotometry, Beer's Law plots, solution preparation
- *Thermochemistry:* heat transfer, Hess's Law, energy equations, calorimetry, energy in reactions, enthalpy ( $\Delta H$ ), enthalpy calculations, entropy, specific heat, exothermic and endothermic reactions
- *Reaction Kinetics:* reaction rates, reaction order, factors that affect reaction rate, catalysts, activation energy, reaction mechanisms, potential energy diagrams
- *Gas & Solution Equilibria:* equilibrium conditions, LeChatlier's Principle, equilibrium constants
- *Acids & Bases:* Bronsted and Lewis theories, relative strengths, pH scale, pOH,  $K_w$ ,  $K_a$ ,  $K_b$  calculations, titration, indicators, titration curves, potentiometric titrations, equivalence point, buffers
- *Electrochemistry:* oxidation, reduction, oxidizing agent, reducing agent, balancing redox equations, electrochemical cells, electroplating
- *Nanotechnology:* preparation and study of gold and silver nanoparticles, preparation of ferrofluids, study of thin film interference, current applications of nanotechnology
- *Organic Chemistry:* alkanes, alkenes, alkynes, hydrocarbons, gasoline and octane number, structural isomers, saturation and unsaturation, functional groups, basic nomenclature using IUPAC rules
- *Nuclear Chemistry:* nuclear particles, radioactive decay processes and equations, nuclear fission, nuclear fusion, nuclear energy

## V. Assignments & Grading

The marking period and course grade will be weighted based on tests and quizzes, final exam, homework and classwork, lab sheets, and a lab report. These grades are weighted according to the table below.

<b>Marking Period Grade</b>		<b>Final Grade</b>	
Homework & Classwork*	10%	Marking Period Grades	20% each
Lab & Activities**	20%	Midterm Exam Grade	10%
Test & Quizzes	70%	Final Exam Grade	10%

\* Classwork could include note-taking, since this is a valuable skill in any college course.

\*\* The lab report, assigned during the first or second marking period, will be a significant grade in the Lab & Activities grade for that marking period.

Please note that the Midterm and Final Exams will NOT be included in the marking period grades, but will be a significant factor in the final course grade. Late work will ***not*** be accepted unless you have a valid, legal excuse. You must present this excuse as soon as you return to class. If you fail to do this, grades for missed work will become ***zeros***.

Any coursework assigned during an excused absence can be made up within a week of its original assignment. This means that labs and other assignments will NOT be made available after a week. It is the student's responsibility to make an appointment to make up this work outside of class. In cases of lengthy absences, exceptions will be made at the discretion of the teacher, but students must request an extension. Any assignments assigned when the student was in attendance, but not turned in because of an excused absence MUST be turned in the day of the student's return to class. ***It is the student's responsibility to ask for and make up any missed work – the instructor will not “chase you down” to complete missed work!***

Laboratory experiences are an important part of any chemistry course; however, horseplay will NOT be tolerated. Any student who chooses to exhibit any type of unauthorized behavior will be asked to leave the lab and will be given a zero for the lab grade. The students would not be allowed to make up the lab for credit. In extreme circumstances, dependent upon the nature of the disruption (at the discretion of the teacher and administration), the course grade could also be forfeit.