

COURSE EXPECTATIONS: AP CHEMISTRY

AP Chemistry will provide students with a background in modern chemistry that will be needed for specialized studies, including college-level chemistry courses. The student will also have completed experiments and problems designed to prepare them for taking standardized chemistry tests, such as the AP Chemistry exam. The basic concepts of nomenclature, mole relationships and stoichiometry are reviewed to help provide background for lab experiments performed. In-depth studies include analytical chemistry techniques, solutions, equilibria, thermochemistry, kinetics, electrochemistry, materials science, organic chemistry and biochemistry.

Teacher Contact Information

Instructor: Tresa Bartosh
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Required Items

- Please cover your textbook, even though you will probably leave it at home.
- A scientific calculator; no qwerty keyboards, but a graphing calculator is OK.
- A 3-ring binder for numerous handouts.
- Bound composition book – to be used for laboratory work ONLY
- Bound composition book or spiral notebook to be used for Homework ONLY
- **ALL** lab work is to be completed in black or blue ink ONLY and all classwork/homework is to be completed in black/blue ink or pencil.

Summer Work

Summer work is designed primarily to reinforce and review the content covered in Honors Chemistry. Students will have access to an AP Chemistry Schoology page where all assignments are posted. All written work will be collected on the first day of class and online submissions are due at the start of the first day of class. Students will need to sign out a book before the start of summer break in order to complete textbook work.

Grading and Assessment Policies:

All assignments will be graded on a point system. Point value will vary based on the amount of work and effort that is required to complete the task. The course will include a variety of assessment including, but not limited to, tests, quizzes, projects, in-class activities, homework, lab and participation. Students will be permitted to hand in an assignment up to one day late, excluding homework which will not be accepted late. All late assignments will earn no more than ½ credit regardless of quality or completeness.

Homework: Chapter questions are located at the END of the chapter. Homework is to be completed in a single subject spiral bound notebook or composition book that can be turned in for grading. Problem sets for each unit will be collected on the day of the unit test. Problem sets will be graded in the following manner: you will receive a maximum of 5 points for completeness; I will select 3 problems from each assignment and grade them in detail--each problem is worth 5 points, for a total of 20 points per assignment. For each problem, a maximum of 1 point off for sig figs, 1 point off for units, 1 point off for math errors. You must show ALL of your “set-ups” and ALL of your work; if you show only the final numeric answer or 1-2 word answers when a calculation or explanation is required, you will not receive credit. This does not apply to questions that are asking for a single word answer.

Practice Exam: Every student will participate in the administration of a practice exam prior to the AP Chemistry test.

Final Exam: All students who do not meet the district requirement of an average year grade of 90% or higher will be required to take the final exam regardless of taking the AP Chemistry exam.

Classroom and Attendance Policies:

Make Up Work:

Students are expected to make up work within the amount of time that they were absent from school. Students are reminded that it is their responsibility to seek out extra help with material/assignments that were covered during an absence. Work that is not turned in within the allotted time will result in a zero for the assignment. Tests must be made up immediately following a student absence. Tests that have not been made up within an agreed upon time frame will result in a zero.

Classroom Rules:

1. Be on time – students should be seated when the bell rings. Tardiness will not be accepted.
2. Be Prepared – Students must always bring paper, pen or pencil, and 3 ring binder to class. Students will not be permitted to leave class to go to their locker for such items. Students will be prepared for lab activities which include appropriate attire.
3. Be Respectful – Students are expected to respect the space, possessions AND opinions of all others in this classroom. Disrespect of any kind will not be tolerated.

**In addition to classroom rules students are responsible to adhere to all school rules and policies in accordance with the student handbook.

Safety:

Lab safety is of crucial importance due to the amount of time you will spend on activities. You will be asked to sign a contract stating your understanding of the policies and your willingness to follow all safety precautions. Due to the presence of potentially hazardous materials (chemicals, bacteria, etc.) eating in a laboratory can be a substantial health and safety risk. Therefore, any food and drink is strictly forbidden at all times in the room! Consuming any food or drink in the classroom, will result in a grade of "0" for your lab or class assignment.

In addition, should any of the lab safety rules covered in class or on the safety contract not be followed, the student will be asked to sit down for the remainder of the lab period and will receive a grade of "0" for the lab.

At the end of the period, you are responsible for cleaning up before dismissal. All supplies must be put in their proper places and the supply area kept neat and clean. All lab stations and the classroom should look exactly the way you found it upon entering.

Communication

In an effort to make sure that both you and your parent/guardian are aware of the course rules and expectations listed above I would like you and your parent/guardian to sign off digitally by printing the parent sign off form, signing the appropriate places and submitting a PDF of the form under the assignment tab for cycle 1. Failure to acknowledge reading the course rules and expectations will result in a zero as a homework assignment.

AP CHEMISTRY SCHEDULE

Listed below is the unit schedule for AP Chemistry. It provides for approximately 3 weeks of review for the AP Chemistry test in early-May. Tests will typically cover multiple units. All assignments, quizzes, tests and lab days may change due to unforeseen circumstances, any and all changes will be announced prior to the assignment due date. Due to the pacing of this course, it is expected that all students complete the reading assignment prior to the start of the material.

Labs: Each unit will have labs specifically designed to reinforce the material being covered at that time. In addition, there are 16 labs that will be incorporated throughout the year to tie multiple concepts together.

1. Analysis of Food Dyes in Beverages
2. Percent Copper in Brass
3. Gravimetric Analysis of Calcium and Hard Water
4. Acidity of Beverages
5. Separation of a Dye Mixture Using Chromatography
6. Qualitative Analysis and Chemical Bonding
7. Green Chemistry Analysis of a Mixture
8. Analysis of Hydrogen Peroxide
9. Separating a Synthetic Pain Relief Mixture
10. Rate of Decomposition of Calcium Carbonate
11. Kinetics of Crystal Violet Fading
12. Designing a Hand Warmer
13. Applications of LeChatelier's Principle
14. Acid-Base Titrations
15. Buffers in Household Products
16. Properties of Buffer Solutions

Unit 1 - Summer Work - Due Day 1 of class

Reading: Chapters 1-3 of Brown, LeMay, Bursten, and Murphy.

Topics: Welcome back to Chemistry (Atoms, Molecules, and Ions)

1. Atoms and the Periodic Table
2. Molecules and molecular compounds
3. Ions
4. Significant figures, dimensional analysis, units of measurement
5. Chemical equations
6. Patterns of chemical reactivity
7. Formula weights
8. Avogadro's number and the mole
9. Empirical formulas from analysis
10. Quantitative information from balanced equations
11. Limiting reactant

**All Norton quizzes are located here:

<http://www.wwnorton.com/college/chemistry/chemistry3/welcome.aspx>

You must complete 15 questions in 1 attempt with an 80% or better to earn credit for the assignment. You may take the quiz as many times as required in order to get credit. Be sure to email your results at bartosht@nadschools.org for credit.

Guided readings 1-4 must be completed and submitted for a completion grade. If the assignment is completed digitally then the document must be shared for grading. Guided readings beyond chapter 5 will be collected after the pre-quiz for completion grading.

- Matter and measurement Chpt 1 – 1, 4, 9
- Sig Fig and Problem Solving Chpt 1 – 10, 14, 19, 22, 24, 25, 28, 50, 56
- Atom and Periodic Table Chpt 2 – 2, 9, 24, 36, 40
- Naming Chpt 2 – 50, 66, 72, 74, 76, 78
- Reactions and Mass Chpt 3 – 5, 8, 20, 26
- Stoichiometry Chpt 3 – 38, 68, 78, 86
- Empirical Formula Chpt 3 – 54, 60, 70

- Molarity and Electrolytes Chpt 4 – 10, 20, 24, 62, 70, 74
- Net Ionic Equations Chpt 4 – 26, 28, 44
- Redox and Activity Series Chpt 4 – 50, 52
- Solution Stoichiometry Chpt 4 – 82, 86, 111
- **Lab Safety Quiz**
- **POGIL Mass Spectroscopy**
- **Norton Chapter 1 Quiz**
- **Norton Chapter 2 Quiz**
- **Norton Chapter 3 Quiz**
- **Saturated Vs Unsaturated POGIL**
- **POGIL Net Ionic Equations**
- **Norton Chapter 4 Quiz**

Unit 1: To Be completed during the First Cycle Of School

- **POGIL RedOx Half Reactions**
- **Chromatography Labette**
- **Density Lab**
- **Hydrate Lab Demo**
- **Unit 1 Test will be during the second cycle of the school year.**

Unit 2

Time: 3 weeks

Reading: Chapters 4-5 of Brown, LeMay, Bursten, and Murphy.

Topics: Reactions In Aqueous Solutions

1. Properties of aqueous solutions
2. Precipitations reactions
3. Acid-base reactions
4. Oxidation-reduction reactions
5. Concentrations of solutions
6. Solution stoichiometry and chemical analysis

Topic: Thermochemistry

1. What is energy?
2. First law of thermodynamics
3. Enthalpy and enthalpies of reactions
4. Calorimetry
5. Hess's Law
6. Enthalpies of formation

UNIT 2 ASSIGNMENTS

- **Stoichiometry Lab**
- **Intro To ReDox Lab**
- **Acid Base Titration Lab**
- **RedOx Quiz**
- Enthalpy Chpt 5 – 6, 8, 25, 29, 40, 44, 48
- Calorimetry Chpt 5 – 54, 56, 58, 60
- **Calorimetry Lab**
- Hess's Law Chpt 5 – 62, 64, 66
- **Heat Of Fusion Lab**
- Enthalpy Of Formation Chpt 5 – 70, 74, 76, 82, 84
- **Norton Chapter 5 Quiz**
- **POGIL Heats of Formation**
- **Unit 2 Test**

Unit 3

Time: 2 weeks

Reading: Chapters 6-7 of Brown, LeMay, Bursten, and Murphy.

Topics: The Electronic Structure of Atoms and Periodic Properties of the Elements

1. Wave nature of light
2. Quantized energy and photons
3. Bohr Model
4. Wave behavior of matter
5. Quantum mechanics and atomic orbitals
6. Many electron atoms
7. Electron configurations and the periodic table
8. History of the periodic table
9. Effective nuclear charge
10. Size of atoms and ions
11. Ionization Energy
12. Electron Affinities
13. Properties of metals, nonmetals, and metalloids
14. Trends for Groups 1A, 2A, 6A, 7A, and 8A

UNIT 3 ASSIGNMENTS

- **Determining Chemical Reaction Stoichiometry**
- Spectroscopes Chpt 6 – 14, 15
- **POGIL Electron Energy and Light**
- **The Hydrogen Atom & Light Activity**
- Atomic History,
Quantum Numbers, Energy Chpt 6 – 21, 26, 37
- **Flame Tests Lab**
- e- configuration, e- dot Chpt 6 – 68, 71, 74
- Zeff Chpt 7 – 11, 14
- Periodic Table & Properties Chpt 7 – 19, 23, 25, 33, 39, 42, 44, 49, 72, 73
- **POGIL Advanced Periodic Trends**
- **Unit 3 Test**

Unit 4

Time: 2 weeks

Reading: Chapters 8-9 of Brown, LeMay, Bursten, and Murphy.

Topics: Chemical bonding and Predicting and Understanding Molecular Shapes

1. Chemical bonds
2. Lewis structures, and the octet rule
3. Ionic bonding
4. Covalent bonding
5. Bond polarity and electronegativity
6. Resonance structures
7. Exceptions to the octet rule
8. Strengths of covalent bonds
9. Molecular shapes
10. VSEPR model
11. Hybrid orbitals
12. Multiple bonds
13. Molecular orbitals and their application to diatomics and simple systems

UNIT 4 ASSIGNMENTS

- Ionic Bonding Chpt 8 – 21, 24, 28, 30
- Covalent Bonding, Lewis Structures Chpt 8 – 13, 14, 33, 48
- Bonds, Oxidation Numbers Chpt 8 – 40, 42, 46, 50, 52, 69, 70
- VSEPR Chpt 9 – 17, 24, 26, 30
- **Molecular Model Activity**
- **VSEPR Model Activity**

- **VSEPR Phet Simulation**
- Dipole Moment Chpt 9 -37, 42
- Hybridization Chpt 9 -50, 51, 52, 57, 58, 61, 77(a,b), 78(a,b)
- **Norton Chemical Bonding Quiz**
- **Unit 4 Test**

Unit 5

Time: 2 ½ weeks

Reading: Chapters 10-11 of Brown, LeMay, Bursten, and Murphy.

Topics: Gases, Liquids, and Solids

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|--|---|
| 1. Pressure | 7. Effusion & Diffusion (Graham's Law) |
| 2. Gas Laws (Boyle's Law; Charles's Law; Avogadro's Law) | 8. Real Gases |
| 3. Ideal Gas Equation | 9. Comparison of gases, liquids, and solids |
| 4. Molar Mass | 10. Intermolecular forces & properties of liquids |
| 5. Partial Pressure (Dalton's Law of Partial Pressures) | 11. Phase changes |
| 6. Kinetic-Molecular Theory | 12. Vapor Pressure |
| | 13. Structures and bonding of solids |

UNIT 5 ASSIGNMENTS

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| ● Gas Laws and KMT | Chpt 10 – 17, 23, 24, 26, 31, 33, 39, 51, 60 |
| ● Gas Law Demo Questions | |
| ● Charles' and Boyle's Law Gizmo | |
| ● Ideal Deviations
Calculations... MW and Density
Effusion/diffusion, Graham's Law | Chpt 10 – 79, 81(a), 85, 89 |
| ● Partial Pressure and Gas Stoichiometry | Chpt 10 – 61, 64, 67, 73, 122 |
| ● POGIL Partial Pressures of Gases | |
| ● Molar Volume Of Hydrogen Lab | |
| ● Intermolecular Forces | Chpt 11 – 14, 16, 20, 24 |
| ● Changes in State | Chpt 11 – 36, 39, 40, 42, 46, 48 |
| ● IMF Lab | |
| ● Solids | Chpt 11 – 59 |

Unit 6

Time: 3 weeks

Reading: Chapters 13-14 of Brown, LeMay, Bursten, and Murphy.

Topics: Properties of Solutions and Chemical Kinetics

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| 1. The solution process | 6. The rate law and impact of concentration |
| 2. Saturated solutions and solubility | 7. Change of concentration with time (1 st and 2 nd order reactions) |
| 3. Factors affecting solubility | 8. Temperature and rate |
| 4. Expressing concentration | 9. Reaction mechanisms |
| 5. Description of reactions rates and factors affecting reaction rates | 10. Catalysis |

UNIT 6 ASSIGNMENTS

- Solutions/Concentration Chpt 13 – 3, 10, 16, 19, 21, 23, 24, 26, 27, 32, 34, 36
- Solubility Chpt 13 - 42a, 44, 49a/c, 52 (not b), 54 (not b/c)
- **POGIL Solubility**
- **Solubility Curve of KNO_3**
- **Norton Solutions and Their Colligative Properties Quiz**
- Kinetics Chpt 14 – 20a/b, 24, 26
- **Absorbance of Gatorade Lab**
- Rate Laws and Equations Chpt 14 – 27, 30, 33, 34, 36, 39a, 40a, 45, 46
- **POGIL Rate of Reaction**
- Mechanisms Chpt 14 – 56, 68, 72, 74
- Catalysis Chpt 14 – 79, 112
- **POGIL Method Of Initial Rates**
- **Unit 6 Test**

Unit 7

Time: 4 weeks

Reading: Chapters 15-16 of Brown, LeMay, Bursten, and Murphy.

Topics: Chemical Equilibrium and Acid-Base Equilibria

1. Concept of equilibrium and the equilibrium constant
2. Interpreting and working with equilibrium constants
3. Heterogeneous equilibria
4. Calculating equilibrium constants
5. Applications of equilibrium constants
6. Le Châtelier's Principle
7. Brønsted-Lowry acids and bases
8. Autoionization of water
9. pH scale
10. Strong acids and bases
11. Weak acids and bases
12. Relationship between K_a and K_b
13. Acid-base properties of salt solutions
14. Acid-base behavior and chemical structure
15. Lewis acids and bases
16. Expressing concentrations

UNIT 7 ASSIGNMENTS

- Equilibrium Constant Chpt 15 – 2, 6, 16, 21, 22, 26, 28,
- **Equilibrium POGIL**
- Calculation and Le Chatelier Chpt 15 – 34, 38, 44, 47, 52, 56, 65, 66, 90
- Reaction Quotient Assumption
- **Application of LeChatelier's Principle Lab**
- Acid-Base, pH Chpt 16 – 5, 16, 18, 24, 26, 28, 32, 36, 38, 44, 46
- Weak Acids, K_a Chpt 16 – 54, 56, 58, 64
- **Determination of K_a of Weak Acids**
- Lewis Theory Chpt 16 – 70, 72, 73
- Weak Bases, K_b
- Salts Chpt 16 – 78, 80, 84, 88
- **Acid-Base Titrations Lab**
- **Unit 7 Test**

Unit 8

Time: 2 ½ weeks

Reading: Chapters 17 and 19 of Brown, LeMay, Bursten, and Murphy.

Topics: Aqueous Equilibria and Chemical Thermodynamics

1. The common ion effect
2. Buffered solutions, acid-base titrations
3. Solubility equilibria, K_{sp}
4. Factors affecting solubility
5. Precipitations and separation of ions
6. Qualitative analysis for metallic elements
7. Spontaneous processes
8. Entropy and the second law of thermodynamics
9. Molecular interpretation of entropy
10. Entropy changes in chemical reactions
11. Gibbs free energy
12. Free energy and the equilibrium constant

UNIT 8 ASSIGNMENTS

- Common Ion/Buffer Chpt 17 – 14, 16, 18, 21, 26, 31
- **POGIL Common Ion Effect on Solubility**
- **POGIL Buffers**
- Strong/Strong Titrations Chpt 17 – 33, 38, 42, 44
- Strong/Weak Titrations
- Solubility Equilibria, K_{sp} Chpt 17 – 53, 54, 60, 64, 73, 75
- Enthalpy/Entropy Chpt 19 – 8, 11, 21, 26, 37, 40
- Gibbs Free Energy Chpt 19 – 50, 54, 60, 65, 69
- Free Energy and Equilibrium Chpt 19 – 71, 74, 78, 79
- **Properties of Buffer Solutions Lab**

Unit 9

Time: 3 weeks

Reading: Chapters 20, 21, and 25 of Brown, LeMay, Bursten, and Murphy.

Topics: Electrochemistry, Nuclear Chemistry, and Organic Chemistry

1. Oxidation states and oxidation-reduction reactions
2. Balancing oxidation-reduction equations
3. Voltaic cells
4. Cell EMF under STP
5. Free Energy and Redox reactions
6. Cell EMF under nonstandard conditions
7. Batteries and fuel cells
8. Corrosion
9. Electrolysis
10. Radioactivity
11. Patterns of Nuclear stability
12. Nuclear transmutation
13. Rates of radioactive decay
14. General characteristics of organic molecules
15. Hydrocarbons
16. Alkanes, alkenes, and alkynes (structures and reactions)
17. Organic functional groups
18. Chirality in organic chemistry

UNIT 9 ASSIGNMENTS

- Balancing Redox Equations Chpt 20 – 18, 19
- Voltaic Cells and EMF Chpt 20 – 24
- EMF and Nernst Chpt 20 – 31, 34, 37, 47
- Electrolysis Chpt 20 – 85, 87, 90
- Corrosion/Batteries Chpt 20 – 69, 82

- Nuclear Chemistry
Emission and Half Life
- Fission and Fusion
- Organic Chemistry
- Organic Chemistry 2

Chpt 21 – 37, 42

Chpt 25 – 22, 23, 24

Chpt 25 – 39, 43

FINAL EXAM