



KAP Chemistry Syllabus

Contact Information

If you need to get a hold of me, I am available. You can email me at anytime. Your parents are welcome to call me if they have questions or concerns. Be proactive, if you have a question contact me before it becomes a problem!

Instructor: Mrs. Hofferberth

Email: khofferberth@mvcasd.us

Classroom: Room 143

Phone: 393-5900 x5601

Course Website: *Hofferberth KAP Chemistry* on MV Moodle 2 (<https://moodle21.mvcasd.us/>)

Course Overview

The school day consists of eight 48-minute periods. KAP Chemistry meets Monday thru Friday, two periods per day. Prerequisites include Physical Science, Biology, Chemistry I, and Algebra II with a B or higher. Concurrent enrollment in Pre-calculus or Calculus is recommended.

KAP Chemistry is a college level course that is designed to not only provide students with a solid general chemistry education but also to develop the student's abilities in the following areas: (1) read, understand, and interpret information from a wide variety of sources, (2) use appropriate problem solving skills, (3) use mathematical reasoning in solving problems, and (4) complete lab experiments, including data acquisition, interpreting the results and acknowledging the uncertainties associated with the experimental outcome. Students should expect to spend a minimum of ½ to 1 hour a day studying outside of class in order to master the course material.

An average of two periods per week is spent in the laboratory. Labs vary from prescribed or "cookbook", to limited investigations with some direction, and finally open ended investigations with little or no direction. Students are required to compile a portfolio of graded lab reports to show schools when you register for college courses. Students are required to take the ACS College General Chemistry Exam in the spring.

I am confident that this class will challenge you to expand both your knowledge of chemistry and your ability to think critically. It is going to be a great year!

Textbook

Textbook:

Chemistry Principles and Reactions ©2004

5th edition by Masterton and Hurley

ISBN 0-534-40878-8

Brooks/Cole-Thompson Learning, Belmont CA 94002

Materials

You will need the following items for this course:

- 3-ring binder with dividers for notes, handouts, and homework
- 3-ring binder (1- 2 inch) for labs, this will be left in the classroom
- pencils and pens (pen required for lab)
- TI-84 or TI-83 calculator, or other graphing calculator

Assessment

Tests (50%): Tests will be announced and typically cover two chapters of the textbook.

Quizzes (10%): Quizzes will be given frequently. They may or may not be announced. The lowest two quiz scores will be dropped each grading period.

Homework (10%): Homework will be collected at the unit test and will be graded for both completion and correctness.

Labs (30%): Formal lab reports are required and must be compiled into a portfolio of graded lab reports. Each report consists of:

- Title Page/Lab Handout
- Purpose
- Procedure
- Table(s) of Data
- Computations
- Graph(s) of Results
- Summary (including error analysis)

I grade according to the approved Mount Vernon High School Student Handbook.

A = 92.5-100%	B = 82.5 – 87.49%	C = 72.5 – 77.49%	D = 62.5 – 67.49%
A- = 90.0-92.49%	B- = 80.0 -82.49%	C- = 70.0 – 72.49%	D- = 60.0 – 62.49%
B+ = 87.5 -89.99%	C+ = 77.5 – 79.99%	D+ = 67.5 – 69.99%	F = below 60%

I strongly encourage each of you to check your course grade online on a weekly basis.

Late Work and Absence Policy

Late work will be penalized 10% per day late. All late work should be placed in the Absent/Late bin and **must be received prior to the unit test to receive credit.**

In the case of absence, it is YOUR responsibility to determine any assignments missed and turn them in within the required time. A list of daily assignments and all handouts will be available in the classroom and on the course website. All work must be made up within the number of days absent unless other arrangements are explicitly approved by me. If you are absent for a lab day, you will be expected to complete the lab outside of regular class time. **All missed work must be completed prior to the unit test to receive credit.**

Course Outline

1. Review of Fundamentals (10 days)
 - A. Measurement, units, and significant figures
 - B. Inorganic nomenclature
 - C. Moles, grams, and molecules
 - D. Empirical formulas, molecular formulas
 - E. Molarity
 - F. Equation stoichiometry
 - G. Labs:
 1. Determination of chloride ion concentration in salt water
 2. Determining the empirical formula of a hydrate
 3. Gravimetric analysis of a metal carbonate

2. Graphical Treatment of Experimental Data (5 days)
 - A. Direct proportions
 - B. Direct square proportions
 - C. Inverse proportions
 - D. Inverse square proportions
 - E. Labs:
 1. Relation between the volume of a gas and its pressure

3. Electronic Structure and the Periodic Table (10 days)
 - A. Nature of light
 - B. The Bohr Atom
 - C. The quantum mechanical atom
 - D. The periodic table and trends in properties of the elements
 - E. Ions
 - F. Labs:
 1. Flame tests

4. Bonding (12 days)
 - A. Ionic bonding
 - B. Covalent bonding
 - C. Polar covalent bonds
 - D. Electronegativities
 - E. Lewis structures
 - F. VSEPR theory
 - G. Resonance
 - H. Formal charge
 - I. Hybridization
 - J. Sigma and pi bonding
 - K. Labs:
 1. Molecular model building

5. Spectrophotometry (12 days)
 - A. Nature of light
 - B. Beer's Law
 - C. Organic nomenclature
 - D. NMR
 - E. IR
 - F. Labs:
 1. Absorption spectra
 2. Beer's law
 3. Synthesis and analysis of a coordination compound
 4. Analysis of an unknown using NMR and IR spectroscopy

6. Gases (12 days)
 - A. Gas laws
 - B. Ideal gas equation
 - C. Avogadro's Law

- D. Dalton's Law of Partial Pressures
 - E. Graham's Law of Effusion
 - F. Kinetic Molecular Theory
 - G. Real vs. ideal gases
 - H. Labs:
 - 1. Molar volume and mass of CO_2
 - 2. Molar volume of H_2
 - 3. Determination of molar mass of a volatile liquid
 - 4. Graham's law of effusion
7. Kinetics (12 days)
- A. Meaning of reaction rate
 - B. Rate law from initial rate data
 - C. Integrated rate laws
 - D. Collision theory of reaction rates
 - E. Factors affecting the rates of reaction
 - F. Catalysts
 - G. Mechanisms
 - H. Potential energy diagrams
 - I. Labs:
 - 1. Factors affecting the rate of a reaction
 - 2. Determination of the rate law of the Iodine Clock reaction
 - 3. Rate Law determination of the Crystal Violet reaction
8. Equilibrium (15 days)
- A. The nature of equilibrium
 - B. The equilibrium constants K_C and K_P
 - C. LeChatelier's principle
 - D. Labs:
 - 1. Pop-bead equilibrium
 - 2. Determining the K_C of the FeSCN^{2+} equilibrium
 - 3. LeChatelier's Principle
9. Solubility Equilibria (5 days)
- A. The solubility product, K_{sp}
 - B. The common ion effect
 - C. Solubility rules
 - D. Labs:
 - 1. Micro-progressive precipitation
 - 2. K_{sp} of calcium hydroxide
 - 3. Qualitative analysis of cations and anions
10. Acid-base Equilibria (15 days)
- A. Acid-base models: Arrhenius, Bronsted/Lowry, Lewis
 - B. Strong acids and bases
 - C. K_w
 - D. pH, pOH
 - E. weak acids and bases, K_a and K_b

- F. Hydrolysis
 - G. Buffers
 - H. Henderson-Hasselbalch equation
 - I. Indicators
 - J. Titrations
 - K. Labs:
 1. Hydrolysis of salts
 2. Buffers
 3. Titration of a strong acid and strong base
 4. Titration of a weak acid with a strong base to find the % acid in vinegar
11. Thermodynamics (15 days)
- A. Nature of heat and heat flow
 - B. First Law of Thermodynamics
 - C. Calorimetry
 - D. Enthalpy
 - E. Hess's Law
 - F. Heats of formation and heats of reaction
 - G. Entropy
 - H. Second Law of Thermodynamics
 - I. Free Energy
 - J. The equilibrium constant
 - K. Labs:
 1. Hess's Law
 2. Urea solubility thermodynamics
12. Electrochemistry (15 days)
- A. Oxidation-reduction reactions
 - B. Redox-titrations
 - C. Electrolysis
 - D. Electrochemical cells
 - E. Cell potentials
 - F. Nernst equation
 - G. Labs:
 1. Mass % of commercial hydrogen peroxide solution
 2. Voltaic cells
 3. Electrolysis of CuCl_2
13. Liquids and Solids (5 days)
- A. Bonding
 - B. Intermolecular forces
 - C. Changes in state
 - D. Heating and cooling curves
 - E. Vapor pressure curves
 - F. Phase diagrams
 - G. Labs
 1. Separation and identification of amino acids
 2. Heat and changes of state

14. Colligative Properties of Solutions (5 days)
 - A. Concentration units: molarity, molality
 - B. Solubility curves
 - C. Colligative properties of solutions
 - D. Labs:
 1. Boiling point elevation and freezing point depression

15. Organic Chemistry (5 days)
 - A. Nomenclature
 - B. Functional groups
 - C. Labs
 1. Synthesis and analysis of aspirin

16. The Nucleus (5 days)
 - A. Radioactive decay
 - B. Transformation rules
 - C. Artificial transformations
 - D. Decay rate and half life
 - E. Labs:
 1. Nuclear decay rate simulation (virtual lab)

All provisions of the syllabus are subject to change at the instructor's discretion – students will be notified of any changes.