***Monarch High School - AP Chemistry***

**Course Syllabus: 2014-2015**

**Instructor:** Mrs. Packard

**Email:** Kathleen.Packard@bvsd.org

**Website:** https://sites.google.com/a/bvsd.org/packard\_chem/home

**Office:** B-205 (upstairs science office), phone 720-561-4329

**Classroom:** B-212

**Required Textbook and Other Materials**:

*Chemistry*, 6th or 8th edition by Steven Zumdahl

I will check out a book to you. You may leave it at home unless otherwise instructed. These are expensive books – take care of them!

Outline/notes to accompany the lectures and labs can be downloaded from my website – see Monarch contact list to find a link to my schoology account. Access code: SM555-2QPCT

**Course Description and Objectives**

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| --- | --- | --- | --- |
| ***Chapter*** | ***Topics Covered*** | ***Pages*** | ***Big Idea*** |
| ***FIRST SEMESTER*** |
| 1 | Chemical Foundations – units, dimensional analysis, sig figs, density | 1-31 |  |
| 2 | Atoms, Molecules and Ions | 40-69 | 1 |
| 3 | Stoichiometry | 76-117 | 3 |
| 4 | Types of Chemical Reactions and Solution Stoichiometry | 129-171 | 3 |
| 5 | Gases | 180-223 | 2, 3 |
| 6  | Thermochemistry | 235-275 | 3 |
| 7  | Atomic Structure and Periodicity | 284-329 | 1 |
| 8 | Bonding | 339-392 | 2 |
| 9 | Covalent Bonding: Orbitals | 403-415 | 2 |
| 10  | Liquids and Solids | 438-486 | 1, 2 |
| ***SECOND SEMESTER*** |
| 11 | Properties of Solutions | 497-530 | 3 |
| 12 | Chemical Kinetics | 539-580 | 4 |
| 13 | Equilibrium | 593-628 | 6 |
| 14 | Acids and Bases | 638-688 | 6 |
| 15 | Acid-Base Equilibria | 697-736 | 6 |
| 16 | Solubility Equilibria | 743-752 | 6 |
| 17 | Spontaneity, Entropy, Free Energy | 772-807 | 5 |
| 18 | Electrochemistry | 816-861 | 3 |

 **Evaluation/Grading Procedures**
Each Semester:

 Tests (each test will be 50% MC and 50% FR) 50% of total grade

 Quizzes (will be timed) 15% of total grade

 Lab reports 20% of total grade

 Final Exam 15% of total grade

**Grading – please do not waste your time and mine by asking me to round up your grade.**

A = 90.00- 100%; B = 80.00-89.99% ; C = 70.00-79.99% ; D = 60.00-69.99% ; F = <59.99%

**Topics/Schedule of Activities**:

**Course Format:**

Lectures are presented during class. It is the students’ responsibility to attend each lecture, read the appropriate sections in their text and practice problems from the text and do problems during lecture as provided. There are days throughout each semester, where students are given problems to work on in class. You are encouraged to collaborate on difficult homework problems from the text.

**Homework:** I will be giving you homework problems sets for each chapter. It is imperative that you practice solving problems in chemistry. You need to plan on spending 30 to 60 minutes daily on chemistry work. If you have difficulty completing a problem, PLEASE let me know. We will work through any questions at the beginning of the next class period.

 **Tests and Final Exam:** There will be several tests and a final exam during the course of the semester.

 **Retake policy:** I know of no college chemistry classes in which students are allowed the opportunity

to do retakes on quizzes or tests. Under exceptional circumstances, I may allow you to retake a test,

 however, there will be additional work on your part to justify my putting in the extra work to rewrite

 a test. In addition, you can expect that the retake will be more difficult than the original test and

 entirely multiple choice questions, so prepare accordingly.

 **Lab Work**

Each lab consists of three items that must be turned in. They are: a pre-lab, your collected data, and a final report. The final report should be submitted electronically to my schoology dropbox unless otherwise indicated.

 ***I. Pre-Lab*:** Pre-labs are to be done BEFORE coming to lab on a separate sheet of paper and

handed in. They consist of the exercises provided in class before the lab. They can be hand

 written, as long as they are neat. No fringes from spiral notebooks, please.

 ***II. Data:*** Your raw data that was collected in the lab - Fully tabulated and well organized. Do

not forget units, labels etc. Make your data tables BEFORE coming to lab.

 **Observations if appropriate**: Several observations about the experiment. These can be as

simple as colorchanges, odors, etc. Make note of all that you see, you never know what is

 important!

 ***III. The Lab Report*** The report consists of a title, purpose, a summary of the data collected, a

conclusion and answers to the questions in the written lab instructions. Your answers should be

 numbered and in order. Answer the questions as completely and thoughtfully as you can. Yes or

 no answers without an explanation or discussion will be considered guesses and not graded.

 The report is your finished product, and should be treated as such. Presentation is very

 important; thus reports **must** be typed, graphs should be computer generated and include labels,

 units, titles and equations for regressions if appropriate. All data should be tabulated, labeled

 and titled. The report is due at the beginning of the following block period.

**Late Work Policy**

This is a college-level course; as such, you are expected to be responsible for your actions and for completing your work on time. Obviously, there may be times you miss class due to illness or other excused absence. For any missed tests, quizzes and experiments, you are expected to complete them in accordance with school policy. This means that if you are absent on the day of a test, you will be expected to take it on the day you return to school. If you are absent on the day of review prior to a test, you will still be expected to take the test on the day you return. All review work is available online. Experiments will need to be performed in B212 during tutor times on M or W or by making an appointment for after school.

 Lab reports or prelab questions will NOT be accepted late for full credit for any reason other than illness or family emergencies. If you attend a school-sponsored field trip, you know well in advance when you will be gone and are expected to turn in your work PRIOR to leaving. If, for some reason, you fail to turn in work when it is assigned, you will lose 50% the minute it is late. However, once I return the graded assignments, you will receive a 0 for that assignment permanently, regardless of how badly it affects your GPA or potential college prospects.

**Experiments Performed:** The following labs (included in both semesters) will require 25% of the instructional time. Guided inquiry labs taken from the College Board lab manual are indicated by \*\*

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| --- | --- | --- |
| **Lab Number** | **Lab Name** | **Science Practices** |
| **First Semester** |
| 1 | Measurement Errors – statistical analysis of the variation in mass lost when popcorn pops. Students measure mass of individual pieces of popcorn before and after popping and generate a spreadsheet with the data and perform statistical analysis of the data. Error analysis plays a large role in the lab report. |  1, 2, 5, 7 |
| 2 | \*\*Can the Individual Components of Quick Ache Relief be used to Resolve Consumer Complaints?  | 1, 2, 3, 4, 5, 6, 7 |
| 3 | Formula of a Hydrate | 1, 2, 4, 5, 6, 7 |
| 4 | \*\*What Makes Hard Water Hard?  | 1, 2, 3, 4, 5, 6, 7 |
| 5 | \*\*How Can We Determine the Actual Percentage of H2O2 in a Commercial (Drugstore) Bottle of Hydrogen Peroxide?  | 1, 2, 3, 4, 5, 6, 7 |
| 6 | MW of a Volatile Liquid | 1, 2, 4, 5 |
| 7 | Hess’ Law Project – Students create a procedure to determine the heat of reaction for Cu2+ (aq) + H2 (g) 🡪 Cu (s) + 2H+ (aq). They must discuss safety issues and get approval before beginning the experiment. Students are allocated resources (chembucks) with which to purchase needed equipment and chemicals. Students’ grades are based on the best procedure, use of resources and lab report.  | 1, 2, 3, 4, 5, 6, 7 |
| 8 | \*\*Sticky Question: How do you separate Molecules that like to stay together? | 1, 2, 3, 4, 5, 6, 7 |
| 9 | Properties of Liquids – Students examine quantitatively the surface tension, viscosity, capillary action and vapor pressure of several different liquids. | 1, 2, 5, 6, 7 |
| 10 | \*\*What Is the Relationship Between the Concentration of a Solution and the Amount of Transmitted Light Through the Solution? | 1, 2, 3, 4, 5, 6, 7 |
| **Second Semester** |
| 11 | Rate Law Experiment – Students use spectrophotometers to determine the absorbance of the reaction between blue dye and bleach in order to determine the rate law for that reaction. | 1, 2, 3, 4, 5, 6, 7 |
| 12 | \*\*Can We Make the Colors of the Rainbow? An Application of Le Châtelier’s Principle | 1, 2, 3, 4, 5, 6, 7 |
| 13 | Calculation of an Equilibrium Constant. Students use Beer’s Law to quantitatively determine the equilibrium constant for the iron (II) thiocyanate equilibrium | 1, 2, 3, 4, 5, 6, 7 |
| 14 | Standardization of NaOH using KHP, determination of concentration of vinegar and molar mass of an unknown acid. | 1, 2, 3, 4, 5, 6, 7 |
| 15 | \*\*The Preparation and Testing of an Effective Buffer: How Do Components Influence a Buffer’s pH and Capacity? | 1, 2, 3, 4, 5, 6, 7 |
| 16 | Electrochemistry / reactivity series | 1, 2, 3, 4, 5, 6, 7 |
| 17 | Qualitative Analysis of a mixture of cations – Students are asked to develop a qualitative analysis scheme for the separation of a mixture of the following ions: Ag+, Al3+, Ba2+, Cu2+, Fe3+, Mn2+, Ni2+, Pb2+, Li+1. Students are given an unknown mixture of 3 of the cations and must separate them into all three different cations successfully. | 1, 3, 4, 5, 6, 7 |

**Activities for Big Idea #1 (non-lab)**

1. Students will graph and interpret several data sets on atomic properties (atomic radius, first ionization energy and electronegativity) in order to arrive at the periodic table from the jumps in the graphs

**Possible Activities for Big Idea #2 (non-lab)**

1. Students will prepare molecular models of the various electron pair arrangements, and complete a table which shows the Lewis structure, electron pair geometry, molecular structure, and use that information to predict the presence or absence of a dipole moment.

**Possible Activities for Big Idea #3 (non-lab)**

1. Students will predict products and balance chemical reactions using a variety of techniques on a series of quizzes from the reactions problem from previous AP exams.

**Possible Activities for Big Idea #4 (non-lab)**

1. Students will explore an animation on rates of reaction at phet.colorado.edu and answer a series of questions regarding their observations about the relationship of different factors to the rate of reaction.

**Possible Activities for Big Idea #5 (non-lab)**

1. Students will explore an animation on heating and cooling curves ([www.kentchemistry.com](http://www.kentchemistry.com), select heating curves) and answer a series of questions regarding their observations of particulate motion in the various phases.

**Possible Activities for Big Idea #6 (non-lab)**

1. Students take the data from a spreadsheet of pH versus added acid or base, and interpret the data in terms of the types of acid or base present, endpoints, the presence or absence of a buffer system, and appropriate indicators with justification based on the data.

**Possible Activities for Societal or Technological Impact of Chemistry (lab or non-lab)**

1. Students solve a stoichiometry problem on the amount of carbon dioxide produced in the burning of a tankful of gasoline (assumed to be 100% octane) with information of the size of the gas tank of the vehicle, the density of octane (0.7028 g mL-1), and a variety of other conversion factors. Following the solution of this problem, a discussion of what happens to this carbon dioxide will ensue encompassing the greenhouse effect, whether the burning of fossil fuels contributes to global climate change, and if something should be done about the burning of fossil fuels (especially given current estimates for the amount of fossil fuel remaining in the earth and the students estimated lifetime).