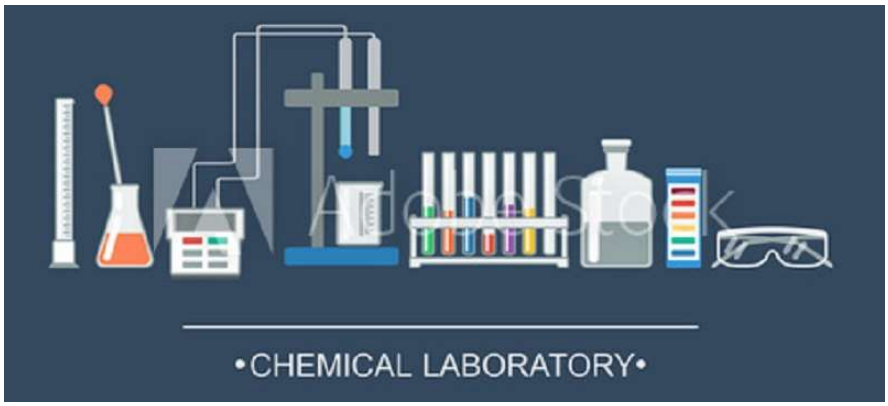
Advanced Chem Lab Techniques:



2021-2022 The Salisbury School

Repository: http://drduick.com/ (click on bubbling Erlenmeyer flask)
Username: jopollack and rymyrick
Password: tsschemlab

This independent study will allow students to work on several chemistry labs associated with AP Chemistry. Students are provided with supplies and protocols for experimentation. Students will work in pairs to solve problems and derive data using laboratory techniques. A group written lab report and presentation will be required after the completion of each lab.

Topic Range:

Big Idea 1: Structure of matter
Big Idea 2: Properties of matter-characteristics, states, and forces of attraction
Big Idea 3: Chemical reactions
Big Idea 4: Rates of chemical reactions
Big Idea 5: Thermodynamics
Big Idea 6: Equilibrium

You will need your laptop and calculator every day!

Laboratory Manual Resources

- Jack Randall, *Advanced Chemistry with Vernier*
- College board, *AP Chemistry Guided-Inquiry Experiments: Applying the Science Practices Teacher Manual*
- *Flynn Scientific Lab Manuals with individual Labs*

Laboratory Program

The laboratory activities are comprised of “hands-on” labs so the students can accomplish multiple trials and can use statistical analysis to derive conclusions. Students are required to have a bound student lab notebook (provided) which will be used as their lab portfolio. For each lab, students will complete a lab report that includes: replicated data tables and answers to the post lab discussion. These items are collected and graded as part of their lab grade. Reports will be compiled on google docs as per instructions given in class.

Flynn scientific labs used during this course are correlated to the AP Chemistry Big Ideas:

The new AP Chemistry curriculum framework is organized around six Big Ideas. These big ideas provide the structure for the course and exam. Each Big Idea includes a set of Learning Objectives. These Learning Objectives are based on the Enduring Understanding and Essential Knowledge statements, which both serve to identify content knowledge and thinking skills that students should be able to demonstrate. There is also a greater emphasis on Science Practices, such as using mathematics skills, data collection and analysis, inquiry investigations, and using models and representations to communicate and solve scientific problems. In this class we will be conducting some of the following experiments using Flynn science lab kits.

Big Idea 1—Atoms and Elements

The chemical elements are fundamental building materials of matter, and all matter can be understood in terms of arrange- ments of atoms. These atoms retain their identity in chemical reactions.

- AP7642, Analysis of Food Dyes in Beverages (Investigation 1)
- AP7643, Percent Copper in Brass (Investigation 2)
- AP7660, Gravimetric Analysis of Calcium and Hard Water (Investigation 3)
- AP7645, Acidity of Beverages (Investigation 4)

Big Idea 2—Structure and Properties of Matter

Chemical and physical properties of materials can be explained by the structure and the arrangement of atoms, ions, or mol- ecules and the forces between them.

- AP7661, Separation of a Dye Mixture Using Chromatography (Investigation 5)
- AP7664, Qualitative Analysis and Chemical Bonding (Investigation 6)

Big Idea 3—Chemical Reactions

Changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.

- AP7653, Green Chemistry Analysis of a Mixture (Investigation 7)
- AP7647, Analysis of Hydrogen Peroxide (Investigation 8)
- AP7662, Separating a Synthetic Pain Relief Mixture (Investigation 9)

Big Idea 4—Kinetics

Rates of chemical reactions are determined by details of the molecular collisions.

- AP7648, Rate of Decomposition of Calcium Carbonate (Investigation 10)
- AP7644, Kinetics of Crystal Violet Fading (Investigation 11)

Big Idea 5—Thermodynamics

The laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter.

• AP7654, Designing a Hand Warmer (Investigation 12)

Big Idea 6—Equilibrium

Any bond or intermolecular attraction that can be formed can be broken. These two processes are in a dynamic competition, sensitive to initial conditions and external perturbations.

• AP7659, Applications of LeChâtelier's Principle (Investigation 13)

• AP7656, Acid–Base Titrations (Investigation 14)

• AP7665, Buffers in Household Products (Investigation 15)

• AP7663, Properties of Buffer Solutions (Investigation 16)

GRADING

50% Lab Notebook:

All lab material must be treated with respect and as if toxic. Students are required to wear goggles at all times during the lab. Failure to do so will result in disciplinary action and a zero in your Lab Notebook Grade for that exercise. It is mandatory that all students clean their workspace after each lab session to prevent contaminating fellow students.

The Lab Notebook:

1. Use **blue or black PEN** in your laboratory notebook
2. First page must have:
    - Date experiment performed
    - Title of experiment
    - Table of Contents
    - Total number of class periods used conducting the experiment
3. Pages should all be numbered
    - Use only the fronts of the pages.
4. All Lab handouts should be maintained in a 1 inch 3 ring binder left in chemistry prep room for easy access.
5. Data recording
    - All data must be recorded **directly in lab notebook** before being compiled in google docs, Do ***not*** fill out the data tables in the handouts, they are examples for how you would construct a table! You will construct your own tables in the Lab Notebook.
    - Graphs (with axis labeled) must be compiled **directly in lab notebook**
    - before producing a polished version in google docs

Lab Notebook Outline (for each experiment):

Introduction

- Title
- Purpose -State the problem/ questions clearly substantiate the question and explain the reason for the investigation?
- Theory (Refer to the handouts)

Materials and Methods

- Procedure (Refer to the handout in your lab folder). Labs must have noted any procedural changes. Give explicit details of methods and give precise quantitative directions. Make sure modifications stated in lab report

Results

- Written results section

Discussion and Conclusion

- Explain all calculations which produced data in data table
- Answers to questions written in complete sentences with question stated in answer (Refer to Handout stapled in lab notebook)
- Explanation of data and results
- All calculations using data

Figures Data Tables

- Data must have numbers with descriptive units in correct significant figures

50% Lab Reports

You must use google docs and your school issued gmail account for all lab reports. Scientific writing is very different than writing in other disciplines. We will actually violate "the rules" for concise sentence writing by making the object the subject, using past tense and very limited use of pronouns. This shift in writing may be difficult for some, however I make it a priority to demystify the situation and help you become a proficient science writer. Specific guidelines for how these should be constructed are provided here (http://drduick.com/a_writing/writing.html). You will be required to present your findings to another class during the semester. These exercises will be instrumental in increasing your scientific communication skills.

Late Work Policy

Points will be deducted for late submissions unless evidence for extenuating circumstances is given prior to submission deadline.

- For daily assignments there is a 50% deduction for a late assignments
- If a long term assignment is late (an assignment that has been posted on the calendar for over a week), there will be a 50% deduction and a parental notification.

Weekly Schedule:

Monday	Tues	Wednesday	Thursday	Friday
1:45-2:20 Ind Study	 No class	**12:05-1:10** Lab time	2:25-3:00 Ind Study	**10:20-11:15** Lab time

Wednesday and Friday will be designated LAB time. The shorter class periods (Monday Thursday) can be used for written work, or study for other classes.

2021 Advance Chemistry Lab ***Dr. Duick***

5pts Read this syllabus, and have this sheet signed and returned before the next class meeting time:

I have read the syllabus and understand the criteria by which I will be evaluated:

Student Signature:_____

Student Name (printed):_____

Student phone number, for texting homework updates

Parent Signature:_____

Parent Name (printed):_____

Parent Email	