

AP Chemistry (*New and Experienced AP Teachers*)
June 19-22, 2018 - Musselman High School, Inwood, WV
Instructor: Mark Case

The AP Summer Institute Workshop is recommended for teachers with at least one or more years of Chemistry teaching experience. It will model an AP chemistry curriculum in which participants will be introduced to both the hands-on and theoretical aspects of specific content areas. The workshop leader will share the most current information regarding the AP Chemistry Curriculum Framework and new exam format. Topics selected for advanced study will be reaction prediction, thermodynamics, kinetics, electrochemistry, as well as equilibria with emphasis on acid/base equilibria, weak acids and bases, buffers, hydrolysis reactions, titration curves, molecular structure, particulate diagrams and descriptive chemistry. A full, daily laboratory component will complement the selected topics. Participants will also have the opportunity to work both individually and collaboratively on homework problems and problem-solving strategies, and to review past AP exams. Group discussions will center on strategies for presentation, and the integration of the laboratory component with the content.

Tuesday, June 19 - 8:00 AM - 4:30 PM

AM

Arrival of Participants: Pick up the books and other free stuff. Sign up for a lab group and participant sharing.

Brief introductions of group- school, subject, grade level, experience, other

Overview of plans for the workshop: content, structure, depth, and breadth and reference materials supplied, including participant flash drive. Integrate concepts, Learning Objectives, Lab work, MC/FR Problem solving

Assignment of selected problems from AP exams, electronic homework, on-line tutorials, and labs to be completed by participants.

Overview of Pre-AP Chemistry curriculum integrating themes, concepts and skills common to AP chemistry.

Suggested AP course timeline, growth of the AP program, Equity and Access to AP, AP

Potential/Aptitude Test, role of guidance counselors, communication with parents, Summer homework, Year's homework assignments & grading methods.

AP Re-design changes in the Chemistry AP program Specific Learning Objectives

Overview of the AP Chemistry Curriculum Framework 2018-2019

Chemistry Framework Activity: Examine Concept Charts for the "6 Big Ideas"

Preview Powerpoint files on participant disk as a review of Chemistry I Basics – nomenclature, mole calculations, stoichiometry

Discuss 3 Levels of lab applications; foundational, intermediate and advanced.

Brief discussion of lab safety and lab reporting methods.

Wet Lab – Gravimetric Analysis - Make 2.00 grams of Compound

Discussion of reaction prediction and writing net ionic equations, as well as thermodynamic changes.

AP laboratory programs: style, equipment, timing, reports, statistics, etc.

Making labs effective, pre- and post-labs, design, evaluation.

Complete the "2014 Practice AP Chemistry Free-Response Question 1a-f" - Applying rubrics

PM

How to go to AP Central and log on to get chemistry course description and new AP developments.

Show and give an overview of the Workshop Handbook, Audit, Syllabi Samples, and Curriculum Survey

Suggested **16 inquiry labs**, original topics expanded in the new Frameworks, available MC and FR exam questions.

Inquiry Wet Lab – College Board Lab #2: %Cu in Brass – Reaction prediction; discuss possible reactions and writing net ionic equations. Spectroscopy techniques.

Participant discussion- How do you use labwork to present content and evaluate student performance?

Summative vs. Formative Assessment Techniques- sample spectroscopy MC questions

2019 Exam format- multiple choice(MC) and free-response(FR) time limits, reference materials, and topics covered.

MC test taking strategies. Try sets of 10 multiple choice problems for speed and accuracy. 10 questions in 12 minutes using Y or N technique.

Wet Lab - Standardization of NaOH with KHP Experiment - lab techniques and quantitative analysis.

Use of Spreadsheets to analyze data, as applicable to NaOH and other AP labs

Assign: 2013 Practice MC Exam questions and **2018 Released FR** Exam questions for group presentations.

Wednesday, June 20 - 8:00 AM - 4:30 PM

AM

Participants present 2013 Practice Exam multiple choice selections.

60 questions; discuss information tested and test taking techniques.

Chemistry Framework Activity: Applying the Learning Objectives & Exclusions Statements

2018-2019 Audit Requirements - Prepare an Audit Syllabus for College Board approval

Inquiry Wet Lab – College Board Lab #14: Effects of structure and concentration of acids on titration curves using a pH probe

Developing Advanced Topics, such as Equilibrium Concepts (Group discussion about what you need to know about equilibrium.)

Teaching through demonstrations: Chem I Equilibrium with soda straws and 10 mL cylinders. Examine plot of data on a graph as it is collected. When is equilibrium established? Finding K_{sp} of saturated NaCl solution. Demo $CoCl_2$ on overhead and with Powerpoint lesson- LeChatlier's Principle.

Wet Lab – Complete K_c lab calculations for $FeSCN^{2+}$ using visual analysis.

PM

- Exploring on-line tutorials for enrichment and remedial lessons, quizzes and tests.
 - Norton Chem Tours describes how “[Equilibrium](#)” is reached when the rates of the forward and reverse reactions become equal.
 - The topics from the 6 Big Ideas in AP Chemistry are explained at [Bozeman Science](#).
 - A collection of 50 awesome [chemistry demonstrations](#) from various youtube clips.
 - [George Wiger's Electronic Homework](#) provide on-line chemistry quizzes.
 - [The World of Chemistry](#) streaming videos and [study guides](#) to be completed while viewing videos.
- Search *Harvey Gendreau's* collection of AP questions on Participant disk for lab procedure questions. Find 1998 AP Free-response question with KHP titration. Discuss answers to question and how to integrate related topics.
- Acid-base equilibria with emphasis on weak acids and bases, hydrolysis reactions, and titration curves; finding the K_a values
- **Dry Lab:** Group discussion of calculations for the preparation and effectiveness of an Acetic acid/Acetate buffer with an assigned pH value.
- **Inquiry Wet Lab** – College Board Lab #13: Applications of LeChatelier's Principle
- Participant sharing – best practices for introducing advanced concepts, such as thermodynamics.

Homework: Complete 1st page of the “Norton Publishing Chemical Bonding Tutorials” worksheet problems dealing with formal charges and hybridization, as an overview of the on-line program found at <http://www.wwnorton.com/college/chemistry/chemistry3/>

Thursday, June 21 - 8:00 AM - 4:30 PM

AM

Demo: Oxidation states of Mn and balancing redox reactions

Group discussion about what you need to know about electrochemistry.

Inquiry Wet Lab – College Board Lab #8: Standardization of KMnO_4 with FAS and determining %Fe in iron pills titration.

Participants present 2018 AP exam free response **questions 1 & 2**

Examples of how grading rubrics are applied at the Reading

Predicting redox reactions using the Standard Reduction Potential(SRP) Table.

Wet Lab – Compare voltaic versus electrolytic cells, E°_{cell} calculations and predict products of electrolysis

PM

Participants present 2018 AP exam free response **question 3**

Discuss using the Nernst Equation, integrating electrochemistry, thermodynamics and equilibrium

Dry Lab – Electrolysis experiment calculations to determine Avogadro's number and Faraday's constant.

Group discussion about what you need to know about kinetics.

Wet Lab – Complete selected sections of inquiry lab: #10 Acid Rain Effect on Marble.

HW: Submit a preliminary syllabus that could be submitted for the 2018-2019 AP Audit. Use the audit checklist to make sure you include all of the required information.

Friday, June 22 - 8:00 AM - 2:30 PM

AM

Wet Lab – Complete selected sections of inquiry lab: #11 Kinetics of Fading Dye Color

Participants present 2018 AP exam free response **questions 4, 5, 6 & 7**

Student performance on the 2018 AP exam, FR score distributions, Q & A

Things to know/memorize for the exam - A/B behavior, solubilities, redox, periodic properties, anions & cations, descriptive chemistry.

Identifying the 9 student Challenge Areas and how to improve student comprehension of difficult topics.

Inquiry Wet Lab – Evaporation rates of liquids. Explain results based on molecular structures of the molecules and intermolecular forces.

PM

Participant sharing presentations – exam preparation strategies, using review and preparation materials, and after-exam activities.

Dry Lab - Draw Lewis structures for the reactants and products in the chemical reactions provided. Then answer the related question for each reaction and *justify* your answers.

Participant presentations of annotated chemistry websites

Becoming an AP Reader and more professional development opportunities

Wrap-up and evaluations

Graduate Credit: Those seeking graduate credit must complete an additional 15 hours. To complete the additional hours, participants must create a syllabus that meets the audit requirements, complete the presentation problems as assigned, and complete various types of lab evaluations for the experiments performed. More information will be provided on the first day of the institute.

PRESENTATION AND DISCUSSION PROBLEMS

*All participants are encouraged to solve **each** question or problem. Assigned groups or individuals will **present** the solutions and/or comments.*

NOTE: "OP" is the Free Response section of the 2018 Operational Exam, completed by the majority (~160,000) of AP Chemistry students

Day	AM Presentation Problems	PM Presentation Problems
Wednesday	2013 Practice MC Exam questions: <i>Work/justify & Comment</i> Group 1: #1-7 Group 2: #8-14 Group 3: #15-21 Group 4: #22-28 Group 5: #29-36 Group 6: #37-44 Group 7: #45-52 Group 8: #53-60	
Thursday	Groups 1 & 2: OP #1 Groups 3 & 4: OP #2	Groups 5 & 6: OP #3
Friday	Group 7: OP #4 & 5 Group 8: OP #6 & #7	