Oakland University
Issues in Education: Advanced Placement Institute – Chemistry

Instructor: Lewis Acampora
Contact Information: Tel: 502.263.3626
E-mail: acampora@stfrancishighschool.com

Course Name: EST XXX ISSUES IN EDUCATION: AP Institute – Chemistry

Course Description: This course is designed to accommodate both new and experienced teachers of advanced placement chemistry. It will cover the general content and the philosophy of the AP Chemistry program, with special focus on chemical equilibrium and the related concepts of thermodynamics and chemical kinetics. Suggested laboratory exercises will be performed and analyzed, accompanied by methods of integrating the laboratory program into the curriculum.

Course Goals: The course aims to

- Familiarize new teachers with the scope and depth of the AP Chemistry syllabus
- Enumerate skills that are essential for success in an AP Chemistry program
- Introduce teachers to sample laboratory exercises that have been successfully employed in the AP Chemistry program. Teachers will learn to set up, perform, and evaluate laboratory exercises pertinent to the AP Chemistry curriculum.
- Use open-ended “chemistry challenges” to allow students to explore and master concepts that are central to success in AP Chemistry.
- Provide insight, discussion, and feedback regarding the scoring of the AP Chemistry examination.

Learning Objectives: Students will have

- Developed a curriculum map that addresses the central and essential topics of the AP Chemistry syllabus.
- Gained perspective regarding the scope and depth of the AP Chemistry syllabus and examination.
- Explored laboratory exercises and demonstrations that illustrate and reinforce the concepts covered in the AP Chemistry syllabus.
- Developed a lesson plan and curriculum map for one unit of the AP Chemistry syllabus.
- Been exposed to effective resources for implementing an AP Chemistry course.
Shrine High School
AP Chemistry
Tentative Daily Schedule of Topics and Exercises

Monday, AM
1. Introductions, Procedures, and Announcements
2. The AP Chemistry Program
3. The AP Chemistry Examination
4. Content – Thermochemistry and Thermodynamics
   a. Enthalpy and Energy
   b. Units, Moles of Rxn
   c. Entropy and Free Energy, Spontaneity
   d. Standard States, $\Delta G$ vs $\Delta G^o$
5. Lab – Hess’s Law and $\Delta H$ of Acid-Base Neutralization Rxns.

Monday, PM
6. Mock Reading – Thermodynamics Problems
7. Chem Challenge No. 01 – The Big Chill
8. Analysis of 2007 APChemistry Examination, Problem 4
9. Assignment
   a. Your AP Philosophy
   b. Writing/Grading Thermochemistry Problems
   c. Rubrics for Evaluation of Lab

Tuesday, AM
10. Open Discussion – AP Philosophy
11. Review of Thermodynamics Grading
12. Content – Chemical Kinetics and Rates of Rxn
   a. Definition of Rxn Rate
   b. The Rate Law – what does it mean?
   c. Models of Chemical Kinetics

Tuesday, PM
14. Molecular Visualization and Simulations of Matter
15. Mock Reading – Chemical Kinetics
16. Chem Challenge No. 02 – Time’s Up
17. Analysis of 2007 APChemistry Examination, Problems 5 & 6
   a. Chemical Visualization using Computational Tools
18. Assignment
   a. Sample Unit Syllabus – Chemical Kinetics
Wednesday, AM
19. Content – Reversible Chemical Reactions and Chemical Equilibrium
   a. Thermodynamics
   b. Kinetics
20. Mathematical Description of the Equilibrium State
   a. The Equilibrium Expression
      i. Concentrations, Activities, and Heterogeneous Equilibria
   b. The Equilibrium Constant
21. Lab – Spectrophotometric Determination of an Equilibrium Constant
22. Mock Reading – Equilibrium Problems

Wednesday, PM
23. Content – $K_{sp}$ and Solubility Equilibria
   a. Mass Solubility, Molar Solubility, and $K_{sp}$
   b. General Heterogeneous Equilibria
   c. Thermodynamics of Dissolving
   d. Coupled Equilibria
24. Lab – Determination of $K_{sp}$ of Lead (II) Iodide
25. Analysis of 2007 AP Chemistry Examination, Problem 1
26. Assignment
   a. Preparation Chemical Demonstration

Thursday, AM
27. Open Discussion – Chemical Demonstrations
28. Content – Acid/Base Equilibria
   a. Autoionization of Water, $[H^+], [OH^-]$
   b. $pH$, $pOH$, $pK_w$
   c. Weak Acids, $K_a$, and $pK_a$
   d. Weak Bases, $K_b$, and $pK_b$
   e. Conjugate Acid/Base Pairs
   f. Acid/Base Titration
29. Lab – Acid/Base Titration
30. Mock Reading – Aqueous Equilibrium

Thursday, PM
31. Content – Buffers
   a. Buffer Zone, Buffer Capacity
   b. Effect of a Strong Acid or Base on a Buffer Solution
   c. Polyprotic Acids
32. Chem Challenge No. 03 – Buffer Zone
33. Analysis of 2007 AP Chemistry Examination, Problems 2 & 3
34. Conclusion
   a. Discussion/Exchange of Ideas
   b. Quo Vadimus?
Required Readings:
