

2010 Syllabus for Chemistry

July 26 – 30, 2010

Institute Overview

Topics selected for study during the summer of 2010 will be thermodynamics, and electrochemistry as well as acid-base equilibria with emphasis on weak acids and bases, buffers, hydrolysis reactions, and titration curves. A full, daily laboratory component will complement the selected topics. Chapter tests which mirror current A.P. ones will be provided as frameworks for group work. Experience with teaching A.P. Chemistry or a previous A.P. Chemistry workshop will be helpful, but is not required.

Consultant Background

Patsy Mueller - AP Chemistry Teacher - formerly of Highland Park H.S in Illinois, currently teaching at Regina Dominican H. S. in Wilmette, Illinois. Patsy was an AP Reader from 1980- 2005 including 15 years as a Table Leader, served on the AP Test Development Committee for four years, and has been an AP Summer Institute consultant since 1991. If you have any questions about the Chemistry APSI between now and then, I can be reached via email at pmueller @ ameritech.net, or by phone at (847) 234-6078.

Institute Preparation

The days are long ones, so come rested. Because sandals are not permitted in the lab, a pair of sneakers or other shoes which cover the surface of your foot will be needed, (Sandals are fine for the lecture/discussion sessions.) Safety goggles are required, and a lab apron or lab coat could be helpful, along with

- a calculator,
- a ruler,
- graph paper with the smaller squares,
- a 3 - ring binder with LARGE rings and 7-8 section dividers for the binder.

Staplers and a 3-hole punch will be provided, but you may find it convenient to bring your own.

Institute Schedule

We meet from approximately 8:00 am -12:00 pm, then 1-4 pm (afternoons are primarily spent doing the lab work). We will finish no later than noon on Friday. Your daily worksheets and/or lab write-ups, etc. will be completed and evaluated "on-site," [Portfolio Assessment] and will be returned to you to take home with you. No assignments will need to be completed after the Institute, unless you register for the WU Graduate Credit Option (see the information below).

Electrochemistry

1. Activity Series exposure
2. Standard and Non-standard Galvanic cells.
3. Nernst Equation applications to equilibrium and equilibrium constants
4. Electrolysis – prediction of products of fused salts vs. aqueous sol'n
5. Electroplating
6. ΔG and ΔS considerations in electrochemistry

Thermodynamics

1. Second Law of Thermodynamics
2. Integration of 1st and 2nd Laws to arrive at Free Energy, ΔG
3. ΔG considerations in Equilibria

4. Applications of Free Energy and kinetics to industrial processes.

Acid-Base Systems and Buffer Solutions

1. Weak acid and weak base equilibria, K_a , K_b
2. Hydrolysis of ionic salts
3. Hydrides, acid anhydrides and basic anhydrides with water
4. "Leveling Effects" in water, NH_3 and acetic acid
5. Analysis and selection of appropriate acid-base indicators.
6. Titrations involving weak acids or weak bases

Laboratory

- 1 Modified Activity Series
- 2 Standard and Non-Standard Cells.
- 3 Redox Titration and Error Analysis
- 4 Thermodynamics- Determination of ΔH , ΔG , ΔS , and K_c for a Cell Rxn
- 5 Investigation of Bronsted-Lowrey Indicators
- 6 Hydrolysis
- 7 Buffer Solutions
- 8 K_a , pK_a , and Molar Mass Determination of Wk Acid- St. Base Titration
- 9 The role of error analysis in AP chemistry

Graduate Credit Option

Participants may also earn three graduate education hours for any of the AP Summer Institutes from Washburn University for a reduced tuition rate and the successful completion of an academic assignment.

Additional Information

Timothy W. Peterson, Ph.D.

Dean of Academic Outreach

Washburn University

1700 College Avenue

Topeka, KS 66621

tim.peterson@washburn.edu

(785) 670-1399 voice

(785) 670-1028 fax