*Natural Approach to Chemistry* Seminar

Our Lady of the Lake University, San Antonio

July 20-24, 2009

A G E N D A

- *We will meet from 9-4 daily at the Saltenfuss Library, Room 100*
- *Mark Koker, LAB-AIDS Director of Curriculum, is your host for the event. Mark's cell phone is 510-562-6245.*
- *Instructor: Dr. Tom Hsu, Senior author of* A Natural Approach to Chemistry
- *The hotel for the meeting (for out of town guests) is the Shearaton Gunter Hotel,* 205 East Houston Street : San Antonio, Texas 78205 : Toll Free (888)999-2089; http://www.gunterhotel.com/index.php.
- Shared ride shuttle from the San Antonio Airport (SAT) is $15-20 one way; taxi is $25-40 one way. We have reserved a block of rooms and will generally cover room and tax from 7/19 to 7/24; be prepared to provide your credit card to cover incidental expenses.
- *Daily shuttle to/from OLLU, meet in the lobby at 8:15 sharp!*
- *Meals: We will provide complimentary continental breakfast and lunch at the college and will host two dinners. We will leave you on your own for the other evening meals as in my experience, chemistry teachers like a little time to themselves!*

**Sunday, July 19**

Out-of-town participants travel to San Antonio and check-in at the Sheraton Gunter Hotel.

Evening: Dinner on your own

**Monday, July 20**

Matter, Measurement, the Atom, and Chemical Reactions

To begin our day we will observe matter, make connections to the periodic table, and learn new ways to introduce the chemical formula. We will do a unique experiment that uses the new Lab Master to measure small amounts of chemicals with a RGB spectrophotometer. This lab increases the students awareness of the importance of "small amounts" that may be

present in the environment. The essence of chemistry is the chemical reaction. Our students often think of chemistry as cool chemical reactions that involve explosions, and color changes. We will conclude the day with experiments that involve chemical reactions and chemical change. Here we will focus on the main reaction types and equation writing, which are often one of the most challenging areas for our students.

Part 1: Observe some elements – discuss matter – reference periodic table

- 2A The Chemical Formula
- 5B Intro to Spectrophotometry
- 5A Inside the Atom

Part 2: Atomic structure – relationship to valence e-'s – Bonding

- Lewis Structures and Model Building 7A and 7B (parts of)- poly ions
- 4C Chemical Change, 10A Chemical Reactions
    - Focus on Reaction Types and Equation Writing

**Evening**: Dinner with the group

**Tuesday, July 21**

<u>Heat, Temperature, Phase changes and Calorimetry</u>

We will do several experiments related to heat, temperature, specific heat, and phase changes. We will use the Lab Master in each of our experiments for heating, and to record temperature and time measurements. These experiments are designed to give students a good sense of the difference between heat and temperature, and how chemical bonds change when substances change phase. We will relate these concepts to calorimetry and chemical reactions occurring in aqueous solutions. Lastly, we will construct a standard curve and determine an unknown concentration of the solution.

Part 1: 3A Heat and Temp
3B Specific Heat
3E Phase Changes

Discuss concepts of heat/temperature, specific heat, and intermolecular forces as presented by the lab and review calculations

Part 2: 9C Solution Calorimetry
9B Solutions and Beer's Law

Discuss calculations and graphing

**Evening:** Dinner on your own

**Wednesday, July 22**

Stoichiometry, Reaction Rates, and Equilibrium

Today we will do experiments that will provide new ways for students to discover the ideas behind difficult concepts, such as the mole ratio, effect of temperature on reaction rate, reversible reactions, and lastly pH. The pH scale will be developed using indicators and the spectrophotometer on the Lab Master. We will be able to use the pH scale we develop to determine the pH's of new solutions.

Part 1: 11A Stoichiometry – baking soda and vinegar
-Review results
12A Respiration and Temperature
-Effects of temperature on reaction rate

Part 2: 13B pH Scale
-Discuss pH
- Graph and determine unknown pH

4 pm PILOT TEACHER MEETING

**Evening:** Dinner on your own

**Thursday, July 23**

Antioxidants and Electrochemistry

Antioxidants are a good connection to our student's daily lives. We will start the day by doing redox titration to determine the amount of vitamin C in tablets, juices and foodstuffs. Using our data we will discuss the chemical reactions and quantitatively determine the amount of Vitamin C using stoichiometry. For the second half of the day we will study how chemicals provide us with electrical energy. We will build a lemon battery and a voltaic cell, which will allow us to investigate how electron transfer occurs. This discussion will delve into the details of the voltaic cell, calculations of $E^o$ cell, and how rechargeable batteries work.

Part 1: 13C Antioxidants - Vitamin C
Titrate vitamin C tablets and then different food stuffs
- Discuss the redox chemistry involved and determining the amount of vit C titrated. Compare advertised value to data.
- Briefly discuss different food stuffs and antioxidants

Part 2: 14A Lemon Battery
14B Electrochemical Cell
- Discussion about redox potentials, $E^o$ cell calculation, sketch out process and describe what is happening
- View simulation

*End of conference program evaluation*

**Evening: Dinner with the group**

**Friday, July 24**

Travel home to enjoy what is left of summer vacation! Safe travels…

NAC Consultant Meeting, Sheraton Gunter Hotel (by invitation only)