CH302 Random Musings April 21, 2009

1. We are rolling downhill to the finish line. In these musings are the question types for Quiz 5, Exam 3 and the Final Exam. Be thinking about the strategy you will be using to earn the grade you want in this course. Some of you will need to think about how to achieve something close to perfection on exam 3 so you can be exempt. Others will need to be concentrating on preparation for the final since they know it will be the way they earn the grade they want. E-mail me if you have questions about the strategy you will use.

2. My office hours are in my office for the next week or so.

3. We will post a worksheet on main group chemistry later this week and two practice quizzes this weekend. This material differs from what we have done the entire year in that basically it is a chance to explore lots of interesting facts about chemistry. You can be sure that what will be on the quizzes and exams will come from the lecture notes and in particular, what I emphasize in class, hence the reason to pay close attention to what we talk about in the Tuesday and Thursday lectures.

4. Deep though on grading--can someone with a 83% and 73% on the first two exams still be exempt? The quick and dirty answer? Yes. Why? Because If you turn in the extra credits you can miss up to 91 points and be exempt. Scores of 83 and 73 percent correspond to missing 13 questions, and at 6 points each, that is 78 points. So you can still miss a couple on the combined quizzes and exam 3. Since exam 3 is by far the easiest, many of you in here in that exam range will be able to just make it over the 609 barrier.

5. The final quiz is next Thursday the 30th. It will cover the material on main group chemistry presented this week in lecture. Traditionally this quiz is intended to give students a very high grade and it has never been the case that a score less than about 90 was earned. It does require some level of knowledge, but it is really a very simple quiz. Here are the question types:

- properties and reactivity of alkali metals
- properties and reactivity of alkali earths
- properties and reactivity of the B family
- properties and reactivity of the N family
- properties and reactivity of the C family
- properties and reactivity of the O family
- famous chemical manufacturing processes
- famous gemstones

7. Question types for Exam 3 the last day of class are found below:

Question Types for Kinetics

1. assigning rate expressions
2. calculating reaction rates
3. units of rate constants
4. method of initial rates
5. integrated rate law calculation
6. integrated rate law calculation (half life)
7. extracting information from straight line plots
8. kinetic theory—collision
9 kinetic theory—transition state
10. Arrhenius equation
11. combined Arrhenius calculation
12. reaction mechanisms
13. reaction mechanisms
14. E_a and energy profiles
15. famous catalysts

Descriptive Chemistry

16. properties and reactivity of alkali metals
17. properties and reactivity of alkali earths
18. properties and reactivity of the B family
19. properties and reactivity of the N family
20. properties and reactivity of the C family
21 properties and reactivity of the O family
22. properties and reactivity of the halogen family
23. famous named manufacturing processes
24. identifying famous gemstones

Organic Molecules

25. hydrocarbon isomers
26. naming organic molecules
27. naming organic molecules
28. organic polymer chemistry
29 biomolecule structure
30. biomolecule structure

8. A reminder that except for about 30 of you who are busting the curve on my exams, the rest should be absolutely getting your extra credits in. Details were posted a couple weeks ago but you need to turn in a description of your experience attending a scholarly lecture or viewing a research poster.

9. I am posting the 60 questions for the final exam today. The source is pretty simple. I took the 3 thirty question tests from the semester and pulled out about 20 questions from each. This is very much a traditional cumulative final covering pretty much everything I have taught. And in keeping with my philosophy that I don't care when you learn it, as long as you learn it, being able to prove to me on May 13th that you know the material well enough for an A is good enough for me.

10. For those of you taking the final for everything, I will tell you once again, if you want to have a chance at an A, you have to get organized. And being organized means making sure your brain knows what is on the final before you start filling it with stuff that otherwise has no place to go. So memorize the question types, all 60. Do it by sections and it doesn't hurt as much. If you don't want to do this, don't bother coming to me for help and forget about getting a good grade on the final..

11. **Poetry Corner**. Let's talk about Arbor Day. Did you know we have Nebraska to thank for Arbor Day? Arbor Day is a nationally celebrated observance that encourages tree planting and tree care. It was started by J. Sterling Morton in Nebraska in 1872. Although the actual day changes from state to state and even city to city, National Arbor Day is celebrated each year on the last Friday in April (the 24th this year). (Arbor Day is not to be confused with Earth Day which is celebrated in many countries on April 22—I think it is possible for Earth Day and Arbor Day to occur on the same day, but that might be an event of such cataclysmic proportions that the world might come to an end, except that it would be kind of ironic that it happened on Earth Day.) Anyway, the first Arbor Day was celebrated in the state of Nebraska in 1872, in response to a state proclamation urging settlers and homesteaders in that prairie state to plant trees that would provide shade, shelter, fruit, fuel, and beauty for residents of the largely treeless plains. Evidently Arbor Day failed in Nebraska.

By the way, do you have any idea how much poetry has been written about trees? Ranks right up there with love poetry I think. To give you an idea, I can actually find poetry by species of tree. For example, listed below is some oak tree poetry. For the tree huggers, a poem by Walt. For those of you who have been dying because of all the oak pollen or those of you who have to rake oak leaves, which simply refuse to be raked, a poem with at best a tinge of grudging admiration from Edna.

What category do I fall in? Well by default I am a tree hater because I at one time consorted with a known tree killer. The story is long and complicated, and basically forced me to take a stand (and the stand in a criminal court proceedings) for the integrity of science over the integrity of the Treaty Oak. Yes, at one time in my life, I was the only witness called to defend the man who danced naked around Austin's once-glorious Treaty Oak, chanting black magic incantations and pouring gallons of herbicide on the poor tree so he could win back a spurned lover. I got sucked into it because I was asked to argue that the way the herbicide was tested wasn't valid scientifically. I didn't realize at the time that I was the only one in Austin defending a man that most people wanted to execute. It didn't help that as I left the stand, the guy jumped up, grabbed my hand, and said, "thank you for believing in me." Not when it made it on to the evening news. Somehow I still got tenure.

Walt Whitman-*"I saw in Louisiana a Live Oak Growing"*

I saw in Louisiana a live-oak growing,
All alone it stood and the moss hung down from its branches,
Without any companion it grew there uttering joyous leaves of dark green,
And its look, rude, unbending, lusty, made me think of myself,
But I wonder'd how it could utter joyous leaves standing alone there without its friend near,
for I knew I could not,
And I broke off a twig with a certain number of leaves upon it, and twined around it a little moss,
And brought it away, and I have placed it in sight in my room,
It is not needed to remind me as of my own dear friends,
(For I believe lately I think of little else than them,)
Yet it remains to me a curious token, it makes me think of manly love;
For all that, and though the live-oak glistens there in Louisiana solitary in a wide flat space,
Uttering joyous leaves all its life without a friend or lover near,
I know very well I could not.

Edna St. Vincent Millay-*"The Oak Leaves"*
Yet in the end, defeated too, worn out and ready to fall,
Hangs from the drowsy tree with cramped and desperate stem
above the ditch the last leaf of all.
There is something to be learned, I guess, from
looking at the dead leaves under the living tree;
Something to be set to a lusty tune and learned
and sung, it well might be;
Something to be learned---though I was ever
a ten-o'clock scholar at this school---
Even perhaps by me.
But my heart goes out to the oak-leaves
that are the last to sigh
"Enough," and lose their hold;
They have boasted to the nudging frost
and to the two-and-thirty winds
that they would never die,
Never even grow old.
(These are those russet leaves that cling all winter,
even into the spring,
To the dormant bough,
in the wood knee-deep in the snow
the only coloured thing.)

Final Exam Questions

Physical Equilbria

1. Theory: temperature and physical equilibria
2. Theory: dissolving gases, liquids, solids
3. Theory: dissolving gases, liquids, solids
4. Ranking: miscibility of liquids
5. Problem: phase diagram navigation
6. Calculation: ΔH for heating across phases
7. Calculation: vapor pressure in binary system
8. Calculation: Clausius Clapeyron
9. Ranking: Van't Hoff and solution conc.
10. Calculation: colligative property

Chemical Equilibria

11. Setting up K from equilibrium expression
12. Calculation: equilibrium concentrations from K
13. Problem: Reaction direction from Q and K
14. Problem: LeChatelier and reaction direction

Water Chemistry

15. Temperature dependence of K_w
16. Ranking A/B strength from K values
17. Approximations of A/B equations
18. Simple A/B calculation (strong, weak, buffer)
19. Simple A/B calculation (strong, weak, buffer)
20. Identifying buffers (after neutralization)
21. Buffer neutralization calculation
22. Identifying features of a titration curve
23. Titration strong A/B with strong A/B
24. Titration weak A/B with strong A/B
26. Estimating solubility from K_{sp} values
27. Calculating molar solubility from K_{sp}
28. Common ion calculation, K_{sp}
29. Equilibrium expressions for a polyprotic acid
30. Amphiprotic polyprotic acid calculations
31. Mass and charge balance
32. Equilibria Calculations: dilute solutions

Electrochemistry

33. relating E, ΔG and K
34. balancing redox equations
35. ranking oxidizing and reducing agents
36. stoichiometry calculation from current
37. interpreting electrochemical cell diagrams
38. cell convention: electrolysis versus voltaic
39. understanding standard reduction potentials
40. calculating cell potentials (not Nernst)
41. calculating cell potentials (Nernst)

Kinetics

42. assigning rate expressions
43. calculating reaction rates
44. units of rate constants
45. method of initial rates
46. integrated rate law calculation
47. extracting information from straight line plots
48. kinetic theory
49. Arrhenius equation theory
50. combined Arrhenius calculation
51. reaction mechanisms
52. E_a and energy profiles
53. famous catalysts

Descriptive Chemistry

54. properties and reactivity of main group elements
55. properties and reactivity of main group elements
56. properties and reactivity of main group elements
57. famous names chemical manufacturing processes
58. naming organic molecules
59. organic polymer chemistry
60 biomolecule structures