CH302 Random Musings: March 22, 2007

1. Welcome back from Spring Break. One of the things that will amaze those of you new to college is how rapidly the last half of the spring semester disappears leading to final exams. For many of you it will be the most challenging academic experience of your life if you are in a bunch of science courses. I still vividly recall my own experience that first spring semester trying to do well in chemistry, calculus, biology, chemistry lab and biology lab plus two liberal arts courses. I don't think I slept the week I had five finals in three days. So just strap on a seat belt and enjoy the ride. It will make what comes later in college seem like a walk in the park.

2. Starting three years ago I decided that second round of children would not grow up thinking that spring break was when you stayed home and did yard work. So beginning with New Orleans, and then the Smokey Mountains, and now New York, my spring breaks involve carting a very large family around in a minivan somewhere far from home. Below are photos of Sam and Nathan ordering $2 hot dogs in Central Park, and Maddie on a horse drawn carriage in the middle of the city realizing: 1) that her dad is a loser and 2) that she will be back to New York, to stay, as soon as she can.

3. The only other thing to add is that by far the most fun I had in New York was driving the streets of the city like a maniac, in a minivan, and realizing I was so good at driving in New York because of my time spent driving through the intersection of 24th and Speedway between classes, every day for the last 20 years.

4. On Worksheet 8 there is a typo that I can't fix easily, so I tell it to you here. The problem is number 2, about NaH_2PO_4 and in the answer key the Na^+ is not considered in the charge balance. Also, if you consider Na^+, there are 7 unknowns, so there are 7 equations needed, and the one additional equation is a mass balance for Na: $C_{NaH2PO4} = [Na+]$. Sorry for the confusion.

5. I want to cut off the new material for the second exam so only half of electrochemistry will be on it. So what I discuss in lecture today is last stuff to show up on exam 2. This should give you a solid week of bounding exactly what you need to learn rather than having to cram last minute information on electrochemistry in all at once. I know this will disappoint some of you and I apologize.

6. I am posting for your use, an approximation of the 30 question types on Exam 2 that will be given on April 2—I reserve the right to make some minor adjustments early next week.

Exam 2: 30 question types

1. Identifying acid and base strength
2. Calculating simple buffers
3. Identifying buffers (after neutralization)
4. Ranking acidity and basicity based on equilibrium constants
5. Buffer capacity
6. Buffer neutralization calculation
7. Identifying features of a titration curve
8. Identifying features of a titration curve
9. Titration of strong acid and strong base
10. Titration of strong acid and strong base (equivalence point)
11. Titration of weak acid/base with strong base/acid (buffer region)
12. Titration of weak acid/base with strong base/acid (equivalence point
13. Estimating solubility from Ksp
14. Calculating molar solubility from Ksp
15. Common ion calculation
16. Approximations: deriving acid base equations from equilibrium theory
17. Approximations: simplifying polyprotic acid calculations
18. Setting up complex equilibrium problems
19. Mass and charge balance
20. Equilibrium expressions for a polyprotic acid
21. Equilibria Calculations: dilute solutions
22. Equilibrium Calculations: sulfuric acid case
23. Equilibrium Calculations: weak polyprotic acids
24. Balancing redox reactions (simple)
25. Balancing redox reactions (in acid or base)
26. Ranking oxidizing and reducing strengths
27. Ranking oxidizing and reducing strengths
28. Assigning EC cell nomenclature
29. Assigning EC cell nomenclature
30. Calculating E_{cell} at standard conditions

7. Extra Credit 1. Reminder. Due on April 1 at 3 am. To earn 1% of your course grade that you can add to your point totals for the semester, complete the assignment below and follow the specific instructions for submission provided in the last few musings. IMPORTANT. You must title the extra credit: Spring break extra credit followed by your uteid. The details have been published twice in the musings, no need to do it again, but those of you thinking of not doing it must either have really solid As or not care what grade you get. A piece of advice: this is where I lower the cutoffs for grades at the end of the year, so do you want to be a part of the lower cutoffs or not?

8. Undergraduate Research Forum. I'm big on doing and since I am not your father so you can listen to me when I say that your education here at UT will be mightily improved if you take the bold step of deciding to engage in an active learning environment. The best such environment, of course, is found in one of the hundreds and hundreds of research labs where people are curing cancer and figuring out how old the universe is. On Friday, April 20 right outside this room, about 150 of your undergraduate peers in the College will be displaying their efforts at original scientific research. You should wander through and be amazed that people just like you are doing all kinds of science that you are just beginning to fathom right now. Use this as motivation to get started yourself—I believe it is the principle reason to go to a large university like UT—surely it isn't the machine graded exams. For more information on the poster session: http://cns.utexas.edu/students/ohris/research.

9. Extra credit number 2 is coming soon. Okay, so some of you remain unconvinced that you should spend time staring at posters about science that might make you feel inadequate compared to your peers. Well what if I offered up 1% of your grade to go to the poster session, find a poster you like, talk to the person standing in front of it for 5 minutes, and then going home and e-mailing me about your experience. More details to follow but the procedure for getting credit will be the same. (For those of you who can't go to the poster session, an alternative bonus opportunity is to walk through a science building on campus on the upper floors, staring at the

walls. You will see scads of research posters that are up for your perusal. Just take a look at one of those and use what you learn that way to earn your bonus points.)

10. Poetry Corner. So now that I am on my research kick, I take a time out from regular poetry to read some prose from a scientist's scientist, C. P. Snow, who is describing that warm tingly feeling he would get in the lab. If you can of well up as I read this, maybe earning a graduate degree in scientific research is the course in life you should chart.

And so for weeks I was alone in the laboratory, taking photographs, gazing under the red lamp at films which still dripped water, carrying them to the light and studying them until I knew every grey speck on them, from the points which were testing my structures down to the flaws and scratches on the surface.

Then, when my eyes tired, I put down my lens and turned to the sheets of figures that contained the results, the details of the structure and the prediction I was able to make…For days my predictions were not only vaguely right, but right as close as I could measure. I still possess those lists of figures, and I have stopped writing to look them over again. It is ten years and more since I first saw them and yet as I read:

Predicted Observed

1.435 1.44
2.603 2.603

and so on for long columns, I am warmed with something of that first glow….It was as though I had looked for a truth outside myself, and finding it had become for a moment part of the truth I sought; as though all the world, the atoms and the stars, were wonderfully clear and close to me, and I to them, so that we were part of a lucidity more tremendous than and mystery

C.P. Snow,
The Search