

## CH302 Random Musings April 9, 2009—All the Extra Credits

1. The exam scores for exam 2 were a 73 for the Thursday exam and a 63 for the make-up exam--pretty much as I expected. The score of 73 was excellent, the highest in the history of the equilibria/electrochemistry exam in this course. I have still to work out with the TAs whether there will be any additional questions dropped from the make-up exam.

2. And of course this is where I remind you to never give up. Many of you came to see me in preparing for the second exam after struggling on the first—some did much better. Some are still getting used to how to do well on this kind of exam. But you have to keep after it. All it takes is getting everything under control and in your head for just one glorious 3 hour period during the final exam in May, and you can have your A for the course as well.

3. Some good news--the last third of the semester prepares you for the last exam of the semester, one that typically has the highest averages, often in the mid to high 80s. Why? It isn't the kinetics material which is quite challenging and makes up a third of the exam. Rather it is the descriptive chemistry that ends the course--a lot of qualitative material that students tend to manage well.

4. We are on to kinetics so as we start, here is an example of kinetics from my own life involving kinetics:

### **Dave figures out how to save hundreds of dollars on potatoes using kinetics.**

Often I shop at WalMart for groceries because they are so darn cheap. Consequently I end up being able to buy a 10 pound bag of potatoes for the cost of a 5 pound bag elsewhere. The problem is that I don't like making mashed potatoes every night of the week, so the potatoes end up sitting around. Before I know it, they have grown those nasty tentacles, which are so disgusting I end up throwing the potatoes away. Like clockwork, every second week, boom, five pounds of tentacled left-over potatoes tossed—I might as well be shopping at Randall's. Then one day I remembered my kinetics and how maybe all that stuff about rates of reactions of chemicals applied to potatoes as well. I stuck a bag of potatoes in the refrigerator in the garage, and have kept it there for 3 months—no tentacles at all. The only problem is that they are in the garage so I forget I have them and the rate of eating mashed potatoes has gone way down as storage time has soared.



2 months in a refrigerator --yummy mashed potatoes

2 months in the pantry--too gross for words

What is particularly enlightening here is that the data that I collected for this kinetics experiments--

**concentration versus time data at two different temperatures**

The data:

Day	tentacle length (78°F)	tentacle length (35°F)
1	0	0
2	0	0
3	0	0
4	0	0
5	2	0
6	3	0
7	5	0
8	7	0

Rate of tentacle growth between days 7 and 8:

$$\begin{array}{l} (35^\circ\text{F}) \\ (78^\circ\text{F}) \end{array} \quad \begin{array}{l} 0 \text{ mm per day} \\ 2 \text{ mm per day} \end{array} = \begin{array}{l} (0-0)/(8-7) \\ (7-5)/(8-7) \end{array}$$

is exactly the kind of kinetics data that you collect for any kind of kinetics experiment--see worksheet 12 from 2008 which is a really good worksheet to do:

<http://laude.cm.utexas.edu/courses/ch302/ws12s08.pdf>

and the source material for today's lecture. Note that the data sets are just like the potato data:

## concentration versus time data at two different temperatures

The data:

Seconds	300K	310K
0	Unknown starting [C]	Unknown starting [C]
1	.12 M	.074 M
2	.074 M	.027 M
3	.044 M	.009 M
4	.027 M	.0036 M
5	.016 M	.0013 M
6	.009 M	.0005 M
8	.0036 M	.000067 M
10	.0013 M	.0000091 M

5. A bit of advice on what makes kinetics so challenging. In a word: vocabulary. Unlike acid base equilibrium where I spent 2 months teaching you how to reduce the problems to simple common forms like  $A^-$  or  $BH^+$ , the material in kinetics is very broadly and quickly covered and involves concepts that will be unfamiliar even to people who had a lot of chemistry in high school. And to top it off, look at why it all seems like such a blur as you consider trying to distinguish the following phrases from one another:

- Rate
- Rate expression
- Rate constant
- Differential rate law
- Integrated rate law
- Method of initial rate
- Rate determining step

Very simply, if you can't explain EXACTLY how each of these is defined, you can't solve kinetics problems.

6. Oh, and here are the question types for quiz 5 next Thursday:

- assigning rate expressions
- method of initial rates
- identifying order of reaction from rate constant
- Arrhenius calculation
- integrated rate law calculation
- half life calculation
- kinetic theory--collision and transition state concepts
- reaction mechanism

7. Worksheets to work. In addition to the two worksheets from last year that are currently posted, I will have a new kinetics worksheet posted soon with the kind of material you would be expected to know for the quiz. In addition I will post a practice quiz 5 in the portal this weekend and the TAs will have a different practice quiz 5 available early next week.

8. Extra Credit assignments and your course grade. No, I don't curve. But as mentioned, I will be offering three extra credit opportunities in this class, each worth 1% of your grade. This is what I do rather than "curving" because I am sure that no one in here wants to get a grade they haven't earned.

So here are the details on earning your 3 extra credit. Procedures for turning in extra credits all follow the extra credit process used for Extra Credit 1--you must follow these in order to get the points--please don't make my life difficult by not doing what you are told.

Procedure:

- Complete the extra credit task below.
- Write it up (probably 100 words or so, but write as much as you want to tell the story.)
- Submit it as plain text in the body of the e-mail (no attachments!!)
- Send it to [dalaude@mail.utexas.edu](mailto:dalaude@mail.utexas.edu) by the deadline
- Jump for joy at having earned 1% of your course grade

#### **Extra Credit Assignment 1:**

- Title: **EC1s09 Spring Break** (If you do not use this subject you will not be filtered into the file from which I assign extra credit.)
- Due Date: Friday March 27 at 5 pm.

**Instructions.** During spring break I want you to teach a science-hater something interesting about chemistry that you have learned in this class. To get the points, the person you teach has to say to you, "gee, I had no idea chemistry was that interesting" when you have finished (you can make them say it even if they don't mean it.) You can choose what you teach but I would recommend that it be something of interest and utility, like the complications of cooking at high altitude if you happen to be skiing at spring break or why fish explode if you happen to be at the beach, or why South Park was wrong or the value of adding salt to water to boil your pasta or why you shouldn't add pure antifreeze to your car or why water balls up on windshields or how neutral water isn't always pH 7 and on and on. It is your choice.

#### **Extra Credit Assignment 2:**

- Title: **EC2s09 Research** (If you do not use this subject you will not be filtered into the file from which I assign extra credit.)
- Due Date: Saturday May 9 at 3 am

**Instructions.** Go to the undergraduate poster session on Friday, April 17th, some time between 11 am and 3 pm in the Welch Foyer (right outside this classroom.)

For details, see: [http://cns.utexas.edu/current\\_students/research/forum.asp](http://cns.utexas.edu/current_students/research/forum.asp)

Find a poster you like, talk to the person standing in front of it for 5 minutes, and then going home and email me about your experience. Spend a few sentences telling me who did the poster, why you liked the poster and how neat it is to see that students your own age are doing world class research that you could also be doing with a little initiative.

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 email me with the same instructions as above except include the name of the first author on the poster.

### **Extra Credit Assignment 3:**

- Title: **EC3s09 Lecture** (If you do not use this subject you will not be filtered into the file from which I assign extra credit.)
- Due Date: Saturday May 9 at 3 am

**Instructions.** This campus is littered with seminars of a scholarly nature that occur in addition to the normal course lectures that are given. Every department will hold literally hundreds of these a year. You will see signs for these posted everywhere. For example, while walking to a help session last week in Geological Sciences, the first four doors I passed, had descriptions of four entirely separate events that were holding multiple scholarly lectures. Typically these talks are about 50 minutes in length with a question answer period and occur in the late afternoon. They occur non-stop, year round, and should become part of your academic experience as you evolve into an intellectual force on campus. Some of you questioned might ask whether concerts or plays might be considered, or whether the presentation has to be about science. My response is that you must establish a relevance to your academic interests. So if you are a pre-med history major I can see going to a talk about breast cancer cures or why Rome fell, but I am not sure you can justify the ballet. But really, I leave it to you to make the justification as part of your explanation of the experience.

9. There is no way in the world that we will collect all 1500 extra credits without something getting messed up. PLEASE PLEASE PLEASE do not treat this as life and death. I guarantee that we will provide a mechanism for you to check whether you received credit and to rectify any errors before grades are assigned. But sending me panicked e-mails asking if you got credit is not the way to do it.

10. Tee-shirts. Somehow I supervise the effort to create tee-shirts for the Natural Sciences freshman orientation. I don't personally get to wear these shirts because of my size, but I do have to sign off on them. I would appreciate your input on tee-shirt design by filling out the form being passed out and returning it to me by the end of the musings. Sorry for the intrusion on your academic life.

8. Poetry Corner. three poems, two from classmates that might resonate with some of you, and one from Gerard Manley Hopkins--I think It is safe to say that you and Gerard trafficked in different worlds.

## **That's Student Life**

In my crazy student life  
As my world goes under,  
I hear a song.  
“Is it all in my head?  
Could everything be alright without me knowing?”  
I think, could it be?  
That this song is sung for me?  
The skies are dark.  
The sidewalks flooded  
“Is it all in my head?”  
Thunder.  
“Is it all in my head?”  
Lightning.  
“Could everything be alright without me knowing?”  
I'm lost.  
Books, papers, printouts, projects.  
Midterm, midterm, midterm, final.  
Out of paper, out of ink, out of energy.  
Exhausted, I'm overcome by sleep.  
In my coma nap I feel,  
Thunder.  
Lightning.  
“Is it all in my head?  
Could everything be alright with out me knowing?”  
As I wake early next morning  
I see, fresh sidewalks,  
A sunny sky.  
And dark clouds on the horizon.  
It's not in my head  
But everything will be alright,  
At least to my knowing.

## The Night Before

With lines upon lines upon two supersized screens  
Creates splitting headaches that forces me to scream,  
“Why, Dr. Laude, why? Why are you so mean?”

Within barely four classes of electrochemistry,  
(And after seven nights where I lost the ability to see)  
You inform me of a test, how can this be?!?

No, seriously, is this a joke?  
A shenanigan meant to make me choke  
On my Spring Break lies, when I told the old parental folks

Which I’ll happily quote, as, “Yes daddy-o, I did try my first drink and boy it was sweet!”  
Then I passed out on my toilet with not another peep  
But now sir, I will admit: I drank myself into a hole; it was very, very deep.

So for the last time, I beg on one knee,  
That I’ll promise to learn: electrochemistry.  
But you must first postpone this test, please, PLEASE, **PLEASE!**

No?!? Why, Dr. Laude, why? Why are you so mean?  
You’ve created splitting headaches that forces me to scream  
“I hate all these lines upon lines upon two supersized screens!!!!!”

Finally,

Written below is one of the most famously challenging poems ever written, and one that is particularly appropriate around Easter, is by my favorite poet, Gerard Manley Hopkins. This guy gave us sprung rhythm, alliteration, and just a really neat way of making the words in the poem sound like what he is describing. People write entire books on this one poem. I still vividly remember the all-nighter during which I had to write a paper on this poem. It really hurt my brain.

## The Windhover

I CAUGHT this morning morning's minion, kingdom  
of daylight's dauphin, dapple-dawn-drawn Falcon, in his riding  
Of the rolling level underneath him steady air, and striding  
High there, how he rung upon the rein of a wimpling wing  
In his ecstasy! then off, off forth on swing,  
As a skate's heel sweeps smooth on a bow-bend: the hurl and gliding  
Rebuffed the big wind. My heart in hiding  
Stirred for a bird, -- the achieve of; the mastery of the thing!  
Brute beauty and valour and act, oh, air, pride, plume, here  
Buckle! AND the fire that breaks from thee then, a billion  
Times told lovelier, more dangerous, O my chevalier!  
No wonder of it: shéer plód makes plough down sillion  
Shine, and blue-bleak embers, ah my dear,  
Fall, gall themselves, and gash gold-vermillion.

- Gerard Manley Hopkins (1845-1889)

*Composed in 1877, Published in 1918*