

CH302 Random Musings, April 19, 2011

1. We are rolling downhill to the finish line. A reminder that the last random musings was a *tour de force* of important information--all the questions for the rest of the course and all the extra credits for the rest of the course are found in that musings. So rather than repeat all of them, I respectively point you to that musings when necessary.

2. So where are we with electrochemistry? Generally quiz 5 was fine with an average near 80. Most missed was the balanced reaction but for no really good reason—it was actually a problem I worked in pretty much every discussion session last week. Still, good work.

3. Miranda's worksheet video clips on electrochemistry are up—my apologies on the delay. I took home the wrong flash drive for the weekend and didn't discover the error until it was too late.

4. Today is the last day of kinetics and I will work a kinetics worksheet for you to try and summarize how you use kinetics data (concentration-time data at different temperatures) can be used to find important kinetics parameters (order, rate, rate constant, amount, activation energy, pre-exponential factor.)

5. There is a quiz 6 next Tuesday--the question types and format will look staggeringly like my practice quiz, so I hope you referenced it when preparing for the quiz.

- assigning rate expressions
- method of initial rates
- *reaction order from rate constants*
- *Arrhenius calculation*
- *integrated rate law calculation*
- *half life calculation*
- *collision and transition state theory*
- *reaction mechanism*

6. 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 what 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 **rates**

7. Lots of kinetics support material is being rolled out. I have posted the three worksheets that are in your notes—I will work through worksheet 14 today. You should spend your time on worksheets 15 and 16 which provide plenty of question types like you will find on the quiz.

8. I have the video clips from Ben for all the rest of the kinetics material. They will be posted tonight. I will have the practice quiz 6s up this weekend—one on Friday night and one on Sunday.

9. **And now for something completely different—knowing without thinking.** The material the last three weeks is mostly telling you a lot of facts, some of them mildly interesting, so that you can appreciate the enormity of chemistry and get prepared for next year's organic course. The amount of material required to learn will probably decrease as I better define what will be on the exam (listen closely for hints).

10. Three extra credits. The equivalent of raising your grade from an A- to an A or a C+ to a B- are out there. But the clock is ticking on getting them in. At this point I have only 648 of a possible 1500. Make sure you follow the directions in the last musings.

11. **Poetry Corner.** Two poems by students and a poem by Gerard Manley Hopkins. So what am I competing with when I teach that the sign of the anode is positive in electrolysis? College students learning about how the world really works. You can see why some times I seem to take a back seat to your primary concern, which is more often matters of the heart.

A clock tells time
but I took the batteries out.
Every second, minute, hour, day, week,
month
that ticks away is the same,
everything beats the same..
every moment feels and sounds the same
without you.
When I'm laughing with you those many
times in your room,
I look at you
and I watch your eyebrows raise,
and your dimples form,
and your goofy grin forming
and your eyes light up.
It does something to me.
I only see perfection.
Last night I thought about you.
In the morning I thought of you.

Moments in between, you were there too.
I want you out!
But I can't get rid of the
tall
simple
blue jean wearing
dark-haired
smart
caring
beautiful
guy.
While I'm thinking of you
and what we could be
and the memories we could make
and the places we could go
and the things we can discover and create
you are thinking
you are salvaging your past
with another girl.

College

They all don the mask,
For whatever the reason
Twirling about in their satisfied ways
Finally, at last, the cure was here-
And all it was, was a dose of change
Take it big or small, little or tall
And decorate it to your fancy
Your new life starts here,
Step aboard and be weary,
For soon that mask won't come off
You'll pull and tug, cursing the dang thing,
But it will remain tied to your face
And after so much effort you placed
Into the glitter and glue, are you sure you want to take it off?
Are you sure you haven't become what you set out to pretend?
It was a time to adventure, a time to try new things,
A time to decide who you were
But at the end of the night, are you still standing tall?
Or have you fallen to the floor,
Laying in your blood and tears

Written below is one of the most famously challenging poems ever written, and one that is particularly appropriate around Easter, 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. 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--Gerard Manley Hopkins

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-vermilion.
- Gerard Manley Hopkins (1845-1889)

And now some science.

Dave figures out how to save hundreds of dollars on potatoes over his lifetime using kinetics concepts

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 if, 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
gross for words**



2 months in the pantry--too

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

Concentration versus time data at two different temperatures for potatoes going bad

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:

$$(35^{\circ}\text{F}) \quad 0 \text{ mm per day} \quad = \quad (0-0)/(8-7)$$

$$(78^{\circ}\text{F}) \quad 2 \text{ mm per day} \quad = \quad (7-5)/(8-7)$$

is exactly the kind of kinetics data that you collect for any kind of kinetics experiment--see worksheet 14 which is a really good worksheet to do 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 for chemical reaction

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

And we can get started calculating rates, finding orders, rate laws, k, Ea and A values.