

CH301 Random Musings, October 14, 2010

1. The results from quiz 3 were very good with an average of 80%. Good for you, though I have to say that the quiz was certainly far easier than the practice quizzes and I am going to definitely be upgrading the difficulty of the next quizzes and the exam as we start to get more quantitative. (In other words, this is technically the easiest material in the entire CH301 and CH302 sequence.) I tossed one question, on the number of pi bonds in NCN-, not because the answer was incorrect, but because it offended my sensibilities in that half of you would be getting it right because you drew one triple bond and half of you could be getting it right because you drew two double bonds—note that even formal charge arguments let us down there.
2. A couple of recent e-mails to brighten my day (I love e-mails that start with, “Okay, you were right”).

From a current student:

Hi Dr. Laude,

I know you get a lot of these every day from kids like me asking for help, but here is another one. I feel like I have been trying and studying a lot for this class lately by doing the worksheets, going to TA sessions to answer questions I do not understand, and doing the practice quizzes and tests in order to prepare but I am still having problems. For example, in preparing for Quiz #3 tomorrow, I feel as though I know the information (I memorized the question types and I suppose I thought I knew the recipes for answering them) but when it came time to take the practice quizzes it became apparent that I didn't understand it. I went to the Learning Center today for help, which did help a little and I have a study group I am going to tonight, so I hope that will help me clear things up. Anyway, I guess I just wanted to let you know, I really do care about how I do in this class and I want to do well, so if there is any further advice you can offer me, please, please do.

Thank you

XXXXXXXXXX

Dear xxxxxxx

Trust in the process. You are beating yourself up and you haven't even done badly yet. The practice quizzes are a lot harder than the regular quiz, for one thing. After you take the quiz, e-mail me with the score you received and we can talk about what to do next, and if we need to meet, we can.

Best,

Dave Laude

Hi Dr. Laude,

Thank you! Okay, so you were right. (Surprise!) Thank you so much for responding and for the encouragement. I did do well on my quiz, thank goodness; I got a 100--WHOOOOOO!!! So I suppose now I have a better idea of how to study for the future. If I have any more questions or concerns I will be sure to either ask you at a discussion session or via email.

Best wishes,

XXXXXXXXXX

From a former student

Dr. Laude,

I don't know if you remember me or not, but I took your chemistry class my freshman year, both semesters. I'm currently taking Organic with Dr. Iverson and we recently took our first test. I just wanted to write to you and tell you how much I appreciate your class and how you taught it even though it was really tough for me at first. On my first organic test I got a 92. I am so happy and I attribute a lot of my success to you. If you hadn't taken the time out to meet with me in your office and personally go over my study skills, I don't think I would have gotten the grade I got. I also appreciate you incorporating organics at the end of CH302. If almost killed my grade in your class, but I got through it and am now doing well in organic because of it. Thanks you so much again.

So look, persevere. You can change your performance in this class, but you have to want it. Taking the final for everything doesn't mean you can coast till then, it means starting right now to change, and by the time the exam comes, you are ready to shine.

3. I have posted the video of my Sunday 7pm "How to get an A" and you can find notes on it in the musings.

4. There is a quiz coming soon (next, Thursday) and like clockwork one week early, here are the 8 question types on the next quiz 4. Note that practice quizzes will be posted this weekend along with worksheet 8 on MO theory and worksheet 9 on gases:

- Determining bond order for a homonuclear diatomic molecule or ion (worksheet 8)
- Determining paramagnetism for a homonuclear diatomic molecule or ion (worksheet 8)
- Ranking bond energy or length based on bond order (worksheet 8)
- Identifying delocalization in a molecule (worksheet 8)
- Ideal gas law calculation for a chemical reaction involving gases (worksheet 9)
- Ideal gas law calculation involving a state change in a gas system (worksheet 9)
- Kinetic Molecular Theory explains gas speed, diffusion or effusion (worksheet 9)
- Ranking non-ideality in gases (worksheet 9)

5. Definition corner: Here is some vocabulary to reinforce what you know as you put all the concepts about bonding together:

- **Electronic geometry** refers to the shapes of the electron rich regions. So erase the atoms and just look at the electron pairs and the five possible answers.
- **Molecular geometry** refers to the 13 possible shapes of the atoms in the molecule and ignores the electrons. So erase the electrons and just look at the shape the atoms take on. If you see a question that states: what is the shape of H₂O, for example, they want to know the shape of the molecule and the answer is "angular." It is these shapes that exhibit the level of symmetry that explains whether a molecule is polar or not.
- **Dipole moment**: a vector describing the orientation of electron density. In this class the DEN is the dipole moment.
- **Ionic bond**: $\Delta EN > 1.5$ Example: Na—Cl
- **Covalent bond**: $\Delta EN < 1.5$ Example: C—O
- **Polar bond**: $\Delta EN > 0$ Example, Na—Cl or C—O
- **Non-polar bond**: $\Delta EN = 0$ Example, Br—Br or C—C
- **Polar molecule (asymmetry)**: $\Sigma \Delta EN > 0$ Example, H₂O or CHCl₃
- **Non-polar molecule (symmetry)**: $\Sigma \Delta EN = 0$ Example, Br—Br or CCl₄
- AOs are **atomic orbitals**. Two AOs are needed to make an MO and AOs are made from individual or combinations (hybrids) of s, p, d orbitals
- MOs are **molecular orbitals** (which is a fancy way of saying bonds) and take an electron from two AOs to make either a s or p bond.
- **Resonance** suggests that there are multiple identical Lewis structures that can be drawn when you have left over p bonds and too many locations on a molecule to put them.
- **Delocalization** is what we should really call resonance. As the name suggests, left over p orbitals tend to spread out (delocalize) over all the regions with identical Lewis structures. Every compound that has resonance actually has delocalized p electrons and so to sound like you know what you are saying, start inserting the word delocalized every time you want to say the word resonance.

6. Deep thought about bonds and molecules and why it makes your brain hurt:

- Polar bonds can be either covalent or ionic, but non-polar bonds are always covalent
- Non-polar molecules can be made of non-polar bonds (like Br_2) but more commonly are made of polar bonds that cancel out to make a non-polar molecule (like CCl_4 or BF_3)
- Ozone (O_3) is crazy backwards. It contains multiple non-polar bonds between O and O, but because of that electron pair bending the bond angle around the central atom, it is a polar molecule!! Something to tell the folks at Thanksgiving.

7. Registration time for spring classes is just around the corner. For those interested in taking my spring CH302 class taught at this time, I have promised that if you meet the pre-reqs for the spring with respect to chemistry and calculus (passing chemistry and enrolled in calculus) then you are guaranteed a seat. To make sure this happens, be in class on Tuesday to fill out a form requesting admission. Don't fill it out? No guarantees.

8. Public Service Announcements:

Parent's Day: Most of you are freshmen and too naïve to realize you don't want your parents coming to visit on Parent's Day. So good news, Parent's Day is this weekend, on October 16th. Each of the Colleges puts on a nice event as part of Parent's Day. In Natural Sciences we have an open house held from 9 to noon on Saturday at the Texas Memorial Museum (the back of TMM is at the bottom of 24th and San Jacinto behind the mustang statue). There will be a brunch buffet, fun activities and the chance to meet faculty, look at some interesting research and program opportunities, and generally have your parent's snoop into your college life (at least the academic part of it.) As I mentioned, if you bring you parents and introduce them to me, I will act like you have gotten to know me really well and that I think the world of you as a student and human being.

See more details below.

9. And now, what I hope all of you have been waiting for, the question types on the second exam—15 questions from Chapter 3, 8 questions from Chapter 4 and 7 questions from Chapter 5.

| number | chapter | Worksheet | Problem type |
|--------|-----------|-------------|---|
| 1 | Chapter 3 | Worksheet 6 | Ranking bond polarity |
| 2 | Chapter 3 | Worksheet 6 | Assigning molecule polarity from VSEPR |
| 3 | Chapter 3 | Worksheet 6 | Assigning molecule polarity from VSEPR |
| 4 | Chapter 3 | Worksheet 6 | Bond angles from VSEPR |
| 5 | Chapter 3 | Worksheet 6 | VB theory of hybrid orbits |
| 6 | Chapter 3 | Worksheet 6 | Electronic geometry from VSEPR |
| 7 | Chapter 3 | Worksheet 6 | Molecular geometry from VSEPR |
| 8 | Chapter 3 | Worksheet 7 | Number of s and p bonds in molecule |
| 9 | Chapter 3 | Worksheet 7 | AOs that comprise MOs in a bond |
| 10 | Chapter 3 | Worksheet 7 | MO theory |
| 11 | Chapter 3 | Worksheet 7 | Filling MOs of diatomic molecules |
| 12 | Chapter 3 | Worksheet 7 | Calculating bond order from MO |
| 13 | Chapter 3 | Worksheet 7 | Assigning paramagnetism from MO |
| 14 | Chapter 3 | Worksheet 7 | Ranking bond length from bond order |
| 15 | Chapter 3 | Worksheet 6 | Identifying delocalization (resonance) |
| 16 | Chapter 4 | Worksheet 8 | Ideal gas law history |
| 17 | Chapter 4 | Worksheet 8 | Gas law change of state calculation |
| 18 | Chapter 4 | Worksheet 8 | Calculating MW, M or ρ from $PV = nRT$ |
| 19 | Chapter 4 | Worksheet 8 | Reaction stoichiometry and $PV = nRT$ |
| 20 | Chapter 4 | Worksheet 8 | Calculation of relative ratio of gas speeds |
| 21 | Chapter 4 | Worksheet 8 | Ranking non-ideality of gases |
| 22 | Chapter 4 | Worksheet 8 | Gas non-ideality theory |
| 23 | Chapter 5 | Worksheet 9 | IMF theory |
| 24 | Chapter 5 | Worksheet 9 | Assigning IMF to molecules |
| 25 | Chapter 5 | Worksheet 9 | Assigning IMF to molecules |
| 26 | Chapter 5 | Worksheet 9 | Defining physical properties |
| 27 | Chapter 5 | Worksheet 9 | Ranking physical properties by IMF |
| 28 | Chapter 5 | Worksheet 9 | Ranking physical properties by IMF |
| 29 | Chapter 5 | Worksheet 9 | Ranking physical properties by IMF |
| 30 | Chapter 5 | Worksheet 9 | Assigning type of solid to compounds |
| 31 | Chapter 3 | Worksheet 5 | Ranking lattice energies |
| 32 | Chapter 3 | Worksheet 5 | Assigning formal charge |
| 33 | Chapter 3 | Worksheet 5 | Using formal charge to predict structure |
| 34 | Chapter 3 | Worksheet 5 | Ranking bond energies/lengths from trends |

10. Poetry Corner. It is the seven-year anniversary of a CH301 student giving me a kitten. This event followed my pathetic musing about how the humane societies wouldn't give me a cat because they took one look at Sam (age three at the time) and Maddie (age 1 at the time) and decided a cat would be better off euthanized. So the student kindly gave us Honey, a sweet kitten, with the one brief mention that he hadn't been fixed because the testicles hadn't dropped. So we waited and waited and waited for the testicles to drop, and then went to a vet who said that he had to have been fixed because there weren't any testicles, and when we swore he wasn't fixed, he did exploratory surgery and called us excitedly to say that we had a "double cryptotoc" cat, or something like that—I think it means something like double ingrown testicles. And this vet of 30 years had never seen a double cryptotoc cat and was excited beyond measure, though not enough to cut us some slack on the \$700 bill it took to find the testicles and cut them out. Anyway, with that experience Honey joined the legions of other animals that I call pets who serve no function other than to make my life all that much more difficult by using my house as their personal toilet.

And so, some angry cat poetry.

Cats by Ogden Nash

The trouble with kittens is that
They grow up to be cats.

**Ode on the Death of a Favorite Cat –
Drowned in a Tub of Goldfishes** by Thomas Gray

Her conscious tail her joy declared;
The fair round face, the snowy beard,
The velvet of her paws,
Her coat, that with the tortoise vies,
Her ears of jet, and emerald eyes,
She saw; and purred applause.
Still had she gazed; but 'midst the tide
Two angel forms were seen to glide,
The genii of the stream:
Their scaly armor's Tyrian hue
Through richest purple to the view
Betrayed a golden gleam.
The hapless nymph with wonder saw:
A whisker first and then a claw,
With many an ardent wish,
She stretched in vain to reach the prize.
What female heart can gold despise?
What cat's averse to fish?
Presumptuous maid! with looks intent
Again she stretched, again she bent,
Nor knew the gulf between.
(Malignant Fate sat by and smiled)
The slippery verge her feet beguiled,
She tumbled headlong in.

Cat Hair by author unknown

Cat hair on the bedspread,
Cat hair on the chair.
Cat hair in the casserole,
Cat hair EVERYWHERE
Cat hair on my best coat,
Even on the mouse!
You live and eat and breathe cat hair,
When cats live in your house.

Cats Sleep Anywhere by Eleanor Farjeon

Cats sleep anywhere, any table, any chair.
Top of piano, window-ledge, in the middle, on the
edge.
Open draw, empty shoe, anybody's lap will do.
Fitted in a cardboard box, in the cupboard with your
frocks.
Anywhere! They don't care! Cats sleep anywhere.

To Mrs Reynold's Cat by John Keats

Cat! Who hast past thy Grand Climacteric,
How many mice and Rats hast in thy days
Destroy'd - how many tit bits stolen? Gaze
With those bright languid segments green and prick
Those velvet ears - but pr'ythee do not stick
Thy latent talons in me - and upraise
Thy gentle mew - and tell me all thy frays
Of Fish and Mice, and Rats and tender chick.
Nay look not down, nor lick thy dainty wrists -
For all the wheezy Asthma, -and for all
Thy tail's tip is nicked off - and though the fists
Of many a maid have given thee many a maul,
Still is that fur as soft as when the lists
In youth thou enter'dst on glass- bottled wall.

*The College of Natural Sciences
Welcomes You to*

FAMILY DAY 2010

SATURDAY, OCTOBER 16, 2010, 9AM-12PM
TEXAS MEMORIAL MUSEUM AT THE
TEXAS NATURAL SCIENCE CENTER

PROGRAM

UNDER THE TENT, 2ND TIER OF PATIO

- 9:30 *Welcome*
Senior Associate Dean for Academic Affairs,
David Laude
- 9:35 *Opening Remarks*
Associate Dean for Curriculum and Programs,
Sacha Kopp
- 9:40 Dean Mary Ann Rankin
- 9:50 Student Speaker, Elaine Sedenberg, Biochemistry Honors,
Dean's Scholars Program
- 10:00 *Closing remarks*
Sr. Associate Dean David Laude
- 10:15 Dr. Jonathan Sessler's Research Group Chemistry Circus

INSIDE TMM, IN THE GREAT HALL, 2ND FLOOR 9AM-12PM

Department of Mathematics
Health Professions Office
School of Biological Sciences
School of Human Ecology
Texas Joint Admission Medical Program (JAMP)

OUTSIDE

1st tier of patio

Light breakfast buffet
Department of Astronomy and the
Astronomy Student Association (ASA)
Department of Chemistry and Biochemistry Advising
Multicultural Students in Natural Sciences (MINS)
Public Health Organizations

2nd tier of patio

Dean's Office Welcome Table
Dean's Scholars Student Association
Department of Physics
First Year Advising
Natural Sciences Council
Office of Honors, Research and International Studies
Science Undergraduate Research Group (SURGe)
UTeach

3rd tier of patio

Department of Computer Science

Bathrooms are located on the 1st and 4th floor of the Museum.