Chapter 9. Cracolice, 2/e. Chemistry X11.

<u>**WRITTEN ASSIGNMENT #3**</u>, due just after we finish Ch 9.
Part 1… Ch 9 #1 a, #4 ac, 13, 14, 37, 39, 40.
Part 2… ask a question.
- Show phases in all equations you write; that is how you learn to identify them.
- Use clear dimensional analysis on all problems involving unit conversions, including all stoichiometric calculations.

This Ch will be on Test 2; try to turn this in at least the week before that test. (If you turn it in on the night Test 2 is handed out, please give me a SASE, so you can get prompt feedback before taking the test. If you miss class, I again suggest that you mail me the assignment.)

Those who are going on in chem are encouraged to do some of the optional sections. I encourage you to turn in some problems from those sections. These will get you started: 19, 25, 32.

> Caution. You need to do <u>lots</u> of problems to become <u>comfortable</u> with the material. I am asking you to turn in a few, so I can spot check how you are doing, but you need to do many more. If you want more feedback, turn in more. You do not need to turn them all in at the same time.

> See attached page for some more problems, at the basic level. You can do these on your own.

$\Rightarrow$ A **practice quiz** largely relating to Ch 8-9 is available at the web site. It includes a question that will help you compare the costs of gas, electricity, and gasoline.

> The practice quizzes are not devoted simply to the material from one chapter. Like tests (and the real world), they often integrate material across chapters. The listed Ch is for convenience.

Chapter 9

$\Rightarrow$ The <u>core</u> <u>material</u> is Sect 1-2 and 9-11. In fact, the core-core material is Sect 1-2. If you master Sect 2, the rest of the chapter follows. And if you don't, the rest won't make sense.

At this point, you know how to write <u>balanced</u> <u>chemical</u> <u>equations</u> (Ch 8) and you know about <u>moles</u> (Ch 7). In fact, a key idea is that a balanced equation shows <u>mole</u> <u>ratios</u> (Ch 8; formalized in Sect 9.1). Further, you know how to use <u>dimensional</u> <u>analysis</u> to guide you through problems (Ch 3). With that background, you are now ready to do <u>stoichiometry</u> problems: problems about "how much" in chemical reactions (Sect 9.2).

The heart of these problems is converting from moles of one chemical to moles of another chemical in the equation (Sect 9.1, which reviews and builds on Sect 8.3). More complex problems require you to also deal with mass (grams) of one or more chemicals, using

g ⇌ mol conversions, which you learned in Sect 7.4. Eqns 9-2 & -3 (p 226) summarize the story. Once you can do this, it's a simple extension to also do calculations with energy in chemical reactions (Sect 10-11, with Sect 9 as background; also recall p 33, Energy in Chemical Change).

The formal assignment for Ch 9 is short. There is not much to read, and not much to say in class. But this is key material (especially for those who are going on in chemistry). As noted above, do LOTS of problems, and do them over a long enough time period that you are able to digest and master -- and get help if needed. It is a reasonable goal to do most of the problems for Sect 1-2, plus the attached page, which covers the same material.

The skipped sections involve calculations in special cases. These sections, like Sect 10-11, build on Sect 2. If you are doing ok with Sect 2, I encourage you to do some of these. They are good Chem 1 material (and they are good for bonus questions on the test).

Sect 3 extends the stoichiometric calculations to problems involving <u>gases</u>. It makes use of a "commonly known" relationship: the molar volume of any (ideal) gas is 22.4 L/mol under "standard conditions" (STP). We will see the basis of this relationship later (Ch 4, 13), but it is easy enough to use.

Sect 4 continues the work with gases, by going on to "non-standard" conditions. I think it is best to leave this section until we have discussed gases.

Sect 5 presents the idea of <u>percent</u> <u>yield</u>. This is something like converting your score on a test to a percentage. But the denominator, the reference point, requires a stoichiometric calculation. If you can do Sect 2 and understand percentage, this Sect follows easily.

Sect 6-8 discuss the idea of <u>limiting</u> <u>reactants</u> (LR). If you do a reaction by mixing two chemicals together, it is unlikely that you have just the right amount of both. One is probably in <u>excess</u>, whereas the other is <u>limiting</u>. Sect 6 presents the concept, which is not particularly difficult. Sect 7-8 present two ways to determine which chemical is limiting. Again, if you can do Sect 2 problems and understand the concept of LR from Sect 6, these problems are straightforward. However, they can be quite lengthy to do. Good Chem 1 material!

<u>Errata</u>

p 248. Example 9.17. There is an "obvious error" in the balancing of the equation. It is clearly a typo, since the set-ups that follow are correct (i.e., use the correct balancing).

p 255. #2 of the "Ten problem-classification examples". There are two numbers intended to be in scientific notation, but with an arrow where the x should be. For example, $9.48 \rightarrow 10^5$ should be 9.48×10^5.

Computer resources (See web page for details and links.)

A discussion of units such as "megaton of TNT" for measuring energy. Listed under Units.

Attached page: Some extra problems for Sections 1-2. They are similar to #1 & 4 from the book, taken together. I think they may be good extra practice with the Ch 9 basics. They may be a good place to start.

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7/10/09