Chapters 1 & 2. Cracolice, 2/e. Chemistry X11.

See the "Chapter handouts" and "Homework" sections of the General Information handout.

Schedule notes. In class 1 we will discuss the general introductory material about the course, science and chemistry. We may begin to preview Ch 2. In class 2 we will discuss most of Ch 2, and also begin Ch 3 (see next handout). The idea is to make a significant start on both the qualitative and quantitative tracks in class 2.

⇒ A "**practice quiz**" for Ch 2 is at the web site.

Chapter 1

You should browse this introductory material. If you haven't done so already, read it for class 2.

Cracolice's main goal in this brief chapter is to develop good chemistry study habits. His advice is good. I encourage you to try his ideas. (The best reason for not doing so is that you already have study habits that serve you well.) See course goals, p 9.

Sect 1.1 & 1.2 provide a good introduction to the scientific method.

Look over the textbook features in Sect 1.5, especially the resources referred to on p 13. There is no need to read these now, but you should be aware of them.

There are no problems or questions for Ch 1.

Chapter 2

We may preview Ch 2 in class 1, but we will cover most of it in class 2. We can discuss questions about the homework in the following class.

Ch 2 introduces the scope of chemistry. It provides important perspective and vocabulary. Fig 2.18 is an excellent summary of most of the chapter.

Sect 2.1 introduces the various levels at which chemists view matter. As Cracolice notes, we often deal with macroscopic (visible) samples, but try to explain what we see at the particulate (atomic, molecular) level. A continuing challenge throughout your study of chemistry is to relate these two levels.

Sect 2.3 discusses chemical and physical changes. I have an entry in my web glossary on chemical changes; it provides additional perspective on this distinction.

> (In Sect 2.9, don't worry about the interconversion of mass and energy. As a practical matter, this interconversion is negligible in ordinary chemistry. See Treptow, 2005, and the Figure from this paper that is posted, for more. Mass and energy, individually, are conserved; Goals 16 & 17 are important.)

This Ch contains a lot of vocabulary. Emphasize using the terms, especially distinguishing related terms. The important terms will get used over and over throughout the course, so refer back to this Ch as needed; you will become more comfortable with the terms as the course proceeds. Memorizing definitions is of little value.

I suggest that you do most of the questions for Ch 2; most are short. (Remember, you have the answers to them, so check yourself.) In any case, be sure to do some for each topic. Use the questions to help you with the ideas and vocabulary from the chapter. Some can probably be answered in more than one way. Bring your disagreements to class (or turn them in) -- with your reasons. You should certainly do the General Questions; if you can do these, you probably have a good handle on the chapter. Problems such as #37 are good for class discussion; try to change the false statements to make them true.

Errata and text notes

p 28. Paragraph on element symbols. The discussion of one- vs two-letter symbols is somewhat incomplete, although a more complete discussion can get confusing. There are many elements with names beginning with C; one has a one-letter symbol. Further, there may be a two letter symbol even if there is only one element starting with that letter (e.g., xenon). In fact, my understanding is that one letter symbols will no longer be assigned. Bottom line… symbols may be one or two letters; don't look for too much logic in why.

Also, two symbols (Hg & W) are based on names that are neither English nor Latin.

Further reading

> Articles listed in handouts are "for fun". You have no obligation to read any of them, but I hope that you find some of interest. Even just reading my annotations here may be of some interest. (If you have trouble getting an article listed in the handouts, check with me; I can usually get you a copy.)
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> There are two web pages listing more articles. One is a list of "Old articles", which used to be in chapter handouts. Some of these, even when too old to include here, are still worth noting. The other is a list of articles on "medical topics". That page was started for the Organic/Biochemistry course (X402), but feel free to browse.
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> For information about using the UC Libraries, including the electronic resources, see the "Library Matters" page at the web site. That page also includes information about doing searches of the scientific literature, to find articles on a topic that interests you. Major topic areas there include: UC Berkeley library; electronic journals; journal articles; Medline searches; citation searches.

H Petroski, Why 'The pencil'? Amer Sci 88:114, 3/00. A delightful article on one major use of one form of carbon. The author is an engineer, and a regular columnist in American

Scientist. In this article, he discusses his book. The book uses the development of a common object to discuss the broad issues of product development, especially from an engineer's viewpoint. Should you read the book? Well, I suggest you read this article first, if you can access it. 400 pages on the history of the pencil is a bit much, but much of it is fun, good history, and a good sense of what engineering is all about. (Did you know that Henry David Thoreau played an important part in the fledgling American pencil industry?) Give the book a try, if you want, but plan to skip sections from time to time.

Book. O Sacks, Uncle Tungsten - Memories of a chemical boyhood. Knopf, 2001. Neuroscientist Oliver Sacks, already well established as a gifted writer for the general audience, here recounts his childhood -- and a good deal of chemical history. The book is delightfully written and the chem is at about the right level for this class. Highly recommended.

> Both books listed above are included on my web page "Books: Suggestions for general reading". I encourage you to browse that page -- and to offer your suggestions for it.

R D King et al, Functional genomic hypothesis generation and experimentation by a robot scientist. Nature 427:247, 1/15/04. Can a robot do science -- including generating and testing hypotheses? They say yes -- and the robot is cheaper. A key question must be, what are the limitations of such a system?

P Maquet & P Ruby, Psychology: Insight and the sleep committee. Nature 427:304, 1/22/04. News. Does sleep stimulate creative thinking? Maybe. They discuss some experimental work on the issue; it is subject to interpretation, but is intriguing.

S Sripanyakorn et al, Dietary silicon and bone health. Nutrition Bulletin 30:222-230, 9/05. Silicon is a major element in the earth's crust, but is not usually considered important in the biology of higher organisms. (Some algae do make silicate skeletons.) However, there is some evidence for roles for trace levels of Si in animal health. This article reviews the stories, and the uncertainties. It is difficult to study, because it is hard to make a Si-free diet.

R S Treptow, $E = mc^2$ for the chemist: When is mass conserved? J Chem Educ 82:1636, 11/05. A discussion of the relationship between mass and energy, introduced in Section 2.9 (and skipped in this course). Fig 5 from this paper is posted with class slides; a quick glance at it will give you an idea when mass-energy interconversion is -- and is not -- quantitatively important.

Computer resources

> All Internet links from class handouts are available, as live links, on my web page of Internet Resources for this course. I usually list the topics here, without giving the specific links; the links are at the web site. Please let me know of any problems with the links.

Beyond the Molecular Frontier: Challenges for Chemistry and Chemical Engineering. What do chemists do? A report on the future of chemistry, from the National Research Council, 2003.

Chapter 2 contains several margin notes directing you to the CD-ROM that comes with your book. I encourage you to explore. General feedback from former students has been that the CD is useful. Please let me know of specific items that you like or do not like.

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