

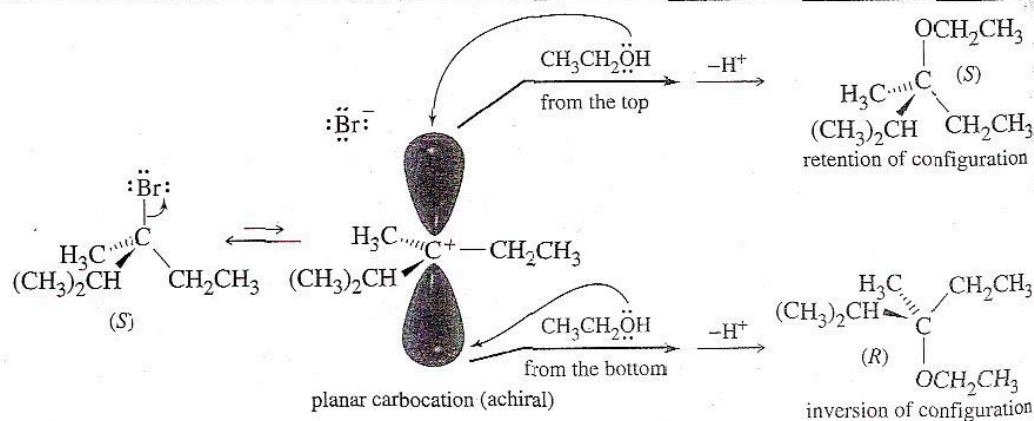
PROBLEM SET #1

DUE: 8:30 am, 13 September 2005

A. ChemDraw (Work individually)

You will need to look up the structures of compounds you do not know before drawing them. Copy the structures from ChemDraw and paste them into an MS Word document. Clearly label each answer with the question number. In making your drawings be attentive to proper relative sizes of different parts of a structure, consistency of font styles and sizes, and distortion of bonds and angles. *Aesthetics are important!*

1. Draw the structure of the substance you have selected for study.
2. Draw the structure of the complex ion $\text{trans}[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$, (cobalt[III]tetraammonium-dichloride).
3. Draw the reaction mechanism $\text{S}_{\text{N}}1$ solvolysis of (R)-2-bromobutane to give racemic 2-butanol. Use the arrow convention to show the movement of electrons. Clearly indicate the stereochemistry of all reactants, intermediates and products. Follow the analogous reaction given in Figure 6-10 from Wade's *Organic Chemistry*, 5th Edition (see below).

MECHANISM Racemization in the $\text{S}_{\text{N}}1$ Reaction

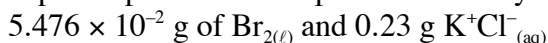
▲ Figure 6-10

An asymmetric carbon atom undergoes racemization when it ionizes to a planar, achiral carbocation. A nucleophile can attack the carbocation from either face, giving either enantiomer of the product.

B. MS Word (Work individually)

In preparing your answers be particularly attentive to the use of subscripts and superscripts and the consistency of font styles and sizes. Add your answers to the Word document that you created for the ChemDraw answers.

1. Use superscripts and subscripts and Insert Symbol command to reproduce the following line.



2. Reproduce the following line using Insert Object / Equation.

$$x = \left[\frac{y^3}{8y - 2} \right]^{1/2}$$

3. Reproduce the following line using Insert Object / Equation.

$$y = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

C. Your Chemical Compound (Work individually)

Browse the reference materials on the shelving immediately behind the science library reference desk, or in the regular reference shelving. Refer also to the bibliography handout. Find your compound in at least one print source. Give the bibliographic citation for one reference source, in ACS format, and briefly list the type of information available for your compound in that source. Keep track of all the data and sources, for comparison with online sources later in the semester.

D. Activities dealing with your special topic (Work with your partner)

1. Initial thoughts. Describe your initial thinking about the topic. What key words did you identify? What terms were unfamiliar to you? What did you already know about the topic?

Consult the Bibliography of Reference Sources to complete the next two exercises, or browse the collection using the call number guide posted in the reference area.

2. Dictionaries, handbooks, and other reference books. Search in several different print sources in the reference collection for background information on your topic. Find definitions for unfamiliar terms, or brief explanations of concepts relevant to your topic. Describe your search process. Make note of the sources consulted, using ACS citation format, and briefly indicate the type of information you found in each source (at least 3 separate sources should be consulted).

3. Encyclopedias. Look for more extensive information related to your topic in an encyclopedia in the reference collection. Do not limit yourself to keywords that address only your specific question; expand the focus of your search to find information that helps put your question in a broader context. Describe your search process (to find the encyclopedias and specific information). Make notes on any relevant information found.

4. **OBIS** and **OhioLINK** (both catalogs are linked from the science library's web page, or from the Oberlin College Library homepage).

a. Search your topic by a combination of Keywords on OBIS. Describe your *precise* search, including Boolean operators and syntax. Describe your search results (number of hits for each search term, dates of publication, relevancy to your topic). Choose the most relevant item. What is (are) the Library of Congress Subject Heading(s) assigned to this item? (Scroll down to view.)

b. Click on the most relevant Subject Heading and search that heading. What heading did you search and what were your results? Repeat the subject search in OhioLINK by clicking Search OhioLINK. Compare the results on OBIS with what you found on OhioLINK, considering the same qualifications listed above. Comment on the differences you observe between Keyword and Subject Heading searches, in both quantity and relevancy to your topic.

5. **Review.** List your new set of key words and searchable terms, and begin to scan some of the books you have identified. Some of the information you have collected so far should have broadened your understanding of the original topic. Write a brief paragraph on this background information. **Provide the complete bibliographic citation for your best source materials to date, using ACS format.** *The ACS Style Guide, 2nd ed.*, is in the science library reference collection; do a title search on OBIS to find its call number.