

Chemistry 500

Spring 2000

Dr. Hunter

Old Exams for Winter 1998

1. (15 marks in total) For *three out of four* of the following questions, give a short answer in the space provided. **Clearly show which ones you want me to grade.** Show your reasoning and/or your work.

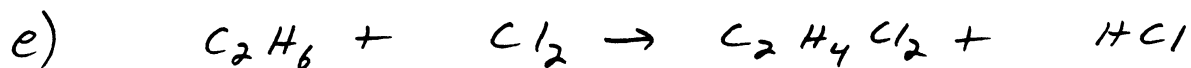
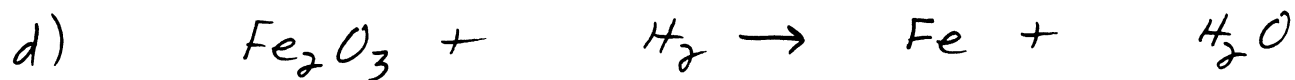
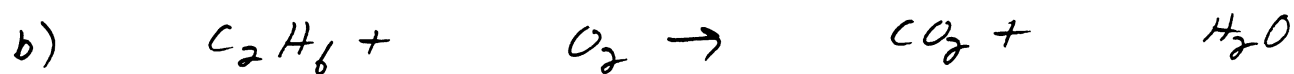
a. Offer an explanation of why Los Angeles has higher levels of O₃ than does San Francisco.

b. Which are the major sources of SO_x pollution?

c. Compared to the gray metal cabinet at the front of the lecture hall, describe objects found in a kitchen that have a volume equal to about 1 ppt and 1 ppb.

d. Clearly describe why H₂S is added to natural gas.

2. (25 marks in total) Balance each of the following reactions.



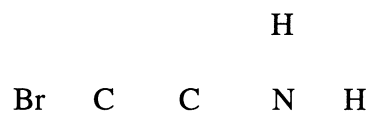
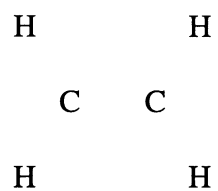
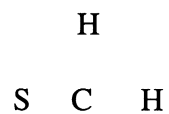
1. (20 marks in total) For *two out of three* of the following questions, give a short answer in the space provided. Show your reasoning and/or your work.

a. Describe the relationship between methane and the greenhouse effect.

b. Give two examples of electromagnetic radiation that have a short wavelength and a high frequency. Give a use for *one* of these.

c. How have the levels of carbon dioxide in the atmosphere changed over time? How do we know what these levels were in the past?

2. (20 marks in total) For *three out of four* of the following molecules give the Lewis electron structure in the space provided. Show your reasoning, any assumptions you make, and/or your work.



1. (20 marks in total) For *two out of three* of the following questions, give a short answer in the space provided. Show your reasoning and/or your work.

a. Discuss three methods that can be used to store solar energy for use when the sun is not shining.

b. Draw the Lewis structures of *five* structural isomers of C_3H_7NO .

c. Clearly describe how one refines petroleum, include in your discussion how one gets the maximum yield of gasoline.

2. (20 marks in total) Below, draw the Lewis structure of a molecule that has at least 10 different kinds of functional groups. Circle each functional group and name it. Be sure you draw in each atom and give it the correct number of bonds.

1. (20 marks in total) For *two out of three* of the following questions, give a short answer in the space provided. Show your reasoning and/or your work.

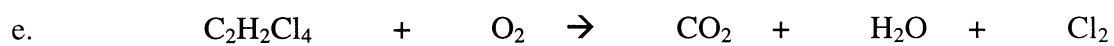
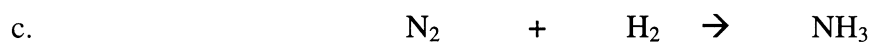
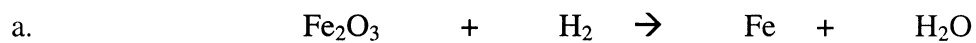
a. Clearly describe three types of radiation.

b. Draw the Lewis structure of a molecule containing an ether, and ester, an alkene, an alkyne, and an alkane functional group.

c. What are the functions of the water inside a nuclear reactor.

2. (20 marks in total) Below, clearly describe the designs of two different types of nuclear weapons.

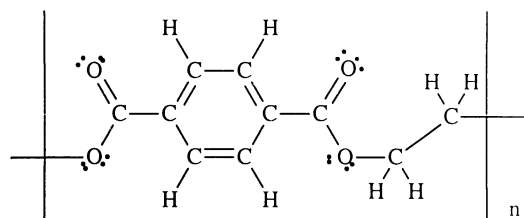
2. (20 marks in total) Balance *four* out of *five* of the following reactions. Show your reasoning and/or your work.



4. (30 marks in total) For *three out of four* of polymers a through d below:

- name each polymer
- name the functional group linking the repeating units in each polymer
- give an example of a small molecule (i.e. one with four carbon atoms) having the same functional group as each polymer
- state whether this polymer is primarily made by synthetic routes or is found in nature
- give a short explanation of what each synthetic polymer is used for or where each natural polymer is found in nature.

a.



polymer name →

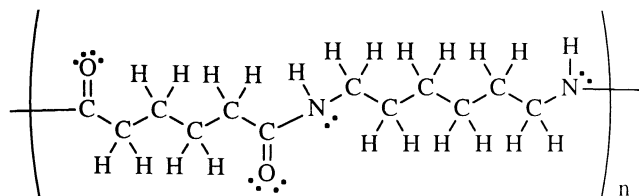
functional group →

small molecule →

synthetic or natural →

use or where found →

b.



polymer name →

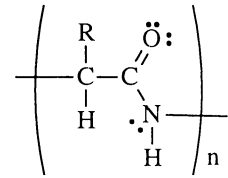
functional group →

small molecule →

synthetic or natural →

use or where found →

c.



polymer name →

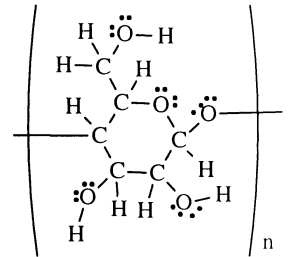
functional group →

small molecule →

synthetic or natural →

use or where found →

d.



polymer name →

functional group →

small molecule →

synthetic or natural →

use or where found →

5. (20 marks in total) For *four out of five* of the following reactions, show the structure of the organic product. Draw in the lone pairs on the starting materials for bonus points.

