Chemistry 500

Spring 2000

Dr. Hunter

Old Exams for Fall 1997

Chemistry 500, First Quiz

Fall 1997

Dr. Hunter

Your Name:_____, _____ Student Number:_____
last first

For all of the questions on the following three pages, make sure you clearly explain your reasoning and show your work. You may use a calculator (you may *not* program information into your calculator) but may not use any other outside materials such as books or notes. If you are unsure of how to interpret any of the questions, please ask me for help. On some of the following questions, you have a choice of which parts to answer. *Circle the letters of the parts you want me to mark.* When you are done, please hand your exam in to me at the front and then either wait quietly in your desk or in the hallway. This quiz is scheduled for 30 minutes at which time class will resume.

Total Grade: /40 (i.e. 10% of the final grade)

1. (30 marks in total) For ***six*** *out of eight* 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 Pittsburgh has higher levels of SO_x than do cities like New York and Los Angles.

b. Which is the minor gas present in air that binds to the hemoglobin in your blood. Give both the name and the formula for this compound.

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 % and 10 ppm. Which is closer to the percentage of Argon in the atmosphere?

d. Circle each of the following reactions that are balanced.

$C_6H_{12}O_6 + 5O_2 \rightarrow 6CO_2 + 6H_2O$

$Cr C_6O_6 + C_6H_6 \rightarrow C_6H_6CrC_3O_3$

$NH_3 + 2NaOCl \rightarrow 2NH_2Cl + NaOH$

e. Balance each of the following reactions.

$N_2O + O_2 \rightarrow NO_2$

$Na + Cl_2 \rightarrow NaCl$

$S_8 + O_2 \rightarrow SO_2$

f. Explain why air is thick near the ground and thin higher in the atmosphere.

g. From the information on the overhead (Table 1.2 in the text), which cities exceeded the EPA permissible limits for sulfur oxides? By how much did Los Angles city exceed the EPA permissible limit for carbon monoxide.

h. Showing your work, estimate how much air you breathe in a day.

3. (10 marks in total) For the following question, give an explanation in the space provided. Describe the various techniques used to determine the structure of a new molecule.

Chemistry 500, Second Quiz

Fall 1997

Dr. Hunter

Your Name:_____,_____ Student Number:_____
last first

For all of the questions on the following three pages, make sure you clearly explain your reasoning and show your work. You may use a calculator (you may *not* program information into your calculator) but may not use any other outside materials such as books or notes. If you are unsure of how to interpret any of the questions, please ask me for help. On some of the following questions, you have a ***choice*** of which parts to answer. ***Circle the letters of the parts you want me to mark***. When you are done, please hand your exam in to me at the front and then either wait quietly in your desk or in the hallway. This quiz is scheduled for 30 minutes at which time class will resume. **Show all of your work!!!!!!!!!!!!!!!**

Total Grade: /40 (i.e. 10% of the final grade)

1. (15 marks in total) For *three out our four* of the following questions, give a short answer in the space provided. Show your reasoning and/or your work.

a. Give an example of a Chlorofluorocarbon and give *three* uses for this class of chemicals.

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

c. Explain what is meant by the concept of the wave/particle duality of light.

d. Give four ways that information about the human toxicity of chemical pollutants is collected.

2. (15 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.

S C O

H

C S

H

H H

N N

H H

Cl

N Cl

Cl

3. (10 marks in total) For each of the following elements, indicate the numbers of protons and neutrons in the nucleus and the number of electrons in the neutral atom. Show your work.

Hydrogen

^{13}C

^{235}U

Chemistry 500, Third Quiz

Fall 1997

Dr. Hunter

Your Name:_____, _____ Student Number:_____
last first

For all of the questions on the following three pages, make sure you clearly explain your reasoning and show your work. You may use a calculator (you may *not* program information into your calculator) but may not use any other outside materials such as books or notes. If you are unsure of how to interpret any of the questions, please ask me for help. On some of the following questions, you have a ***choice*** of which parts to answer. ***Circle the letters of the parts you want me to mark***. When you are done, please hand your exam in to me at the front and then either wait quietly in your desk or in the hallway. This quiz is scheduled for 30 minutes at which time class will resume. **Show all of your work!!!!!!!!!!!!!!!**

Total Grade: /40 (i.e. 10% of the final grade)

1. (15 marks in total) Define the terms "biosphere" and "geosphere" and use these terms to discuss the Carbon Cycle.

2. (15 marks in total) For *three out of four* of the following molecules give the Lewis electron structure in the space provided and use the Lewis structure to predict the bond angles and relative bond lengths.

O C H

H

H

H C O H

H

H H

N N

H H

H

H C N O

H

3. (10 marks in total) Give five different sources of methane in the environment. Discuss the role of methane in global warming.

Chemistry 500, Forth Quiz

Fall 1997

Dr. Hunter

Your Name:_____, _____ Student Number:_____
last first

For all of the questions on the following three pages, make sure you clearly explain your reasoning and show your work. You may use a calculator (you may *not* program information into your calculator) but may not use any other outside materials such as books or notes. If you are unsure of how to interpret any of the questions, please ask me for help. On some of the following questions, you have a ***choice*** of which parts to answer. ***Circle the letters of the parts you want me to mark***. When you are done, please hand your exam in to me at the front and then either wait quietly in your desk or in the hallway. This quiz is scheduled for 30 minutes at which time class will resume.

Total Grade: /40 (i.e. 10% of the final grade)

1. (15 marks in total) For ***three*** *out of four* of the following questions, give a short answer in the space provided. Show your reasoning and/or your work.

a. In molecular terms, what ~~causes~~ is heat?

b. Give a definition of an exothermic reaction.

c. Where are Tar Sands found and what are they?

d. What is the similarity between Moonshine and Oil Refining?

2. (10 marks in total) Using text and a diagram, clearly explain what is meant by the Energy of Activation of a reaction.

3. (15 marks in total) Explain the process by which coal is formed. Include a discussion of the different types of coal in your answer.

Chemistry 500, Final Exam

Fall 1997

Dr. Hunter

Your Name:_____, _____ Student Number:_____
last first

For all of the questions on the following five pages, make sure you clearly explain your reasoning and show your work. You may use a calculator (you may *not* program information into your calculator) but may not use any other outside materials such as books or notes. If you are unsure of how to interpret any of the questions, please ask me for help. On some of the following questions, you have a ***choice*** of which parts to answer. ***Circle the letters of the parts you want me to mark***. Give clear explanations/reasoning for each of your answers. Use diagrams in your answers where appropriate. When you are done, please hand your exam in to me at the front and then either wait quietly in your desk or in the hallway. This exam is scheduled for 2 hours.

Total Grade: /100 (i.e. 50% of the final grade)

1. (15 marks in total) For *three out of four* of the following, answer the questions.

a. Explain what is meant by the term "cracking" of petroleum.

b. What is meant by the term "Greenhouse Effect".

c. Compared to the gray metal cabinet, how large would a ppb be.

d. For the molecule $\mathbf{CH_2O}$, calculate the percent composition for all of the elements.

2. (20 marks in total) Clearly explain why air pressure is high near the ground and decreases as one goes higher into the air.

3. (25 marks in total) Balance each of the following reactions in the space provided. State whether an increase in the amount of the *circled* chemical would speed up or slow down each reaction. Show your reasoning and/or your work.

a. $C_6H_6 + (Cl_2) \longrightarrow C_6H_3Cl_3 + HCl$

b. $P_4 + O_2 \rightarrow P_4O_{10}$

c. $C_{16}H_{34} \longrightarrow C_8H_{16} + (C_8H_{18})$

d. $C_2H_4 + O_2 \longrightarrow C_2H_4O$

e. $CO_2 + H_2O \longrightarrow C_6H_{12}O_6 + O_2$

4. (30 marks in total) For *three out of four* of the following questions, give a short answer in the space provided. Show your reasoning and/or your work.

a. Explain why sticking you hand in a hot oven for 5 seconds will not burn it but touching the oven rack in the same oven for even a fraction of a second will produce a burn.

b. What is the difference between chronic and acute toxicity. Give one example of a chemical showing each kind of toxicity.

c. What is the molecular weight of each of the following compounds: C_2H_6 and N_2O_4.

d. Define the term isotope and give three isotopes for carbon.

5. (10 marks in total) For the following molecules, give the Lewis electron structures in the space provided. Show your reasoning, any assumptions you make, and/or your work. Predict the bond angles around each atom.

O N N O

H C C C C Cl