AP Chemistry Final Exam Version M Fall 2005

3 Free Response questions, 45 minutes

CALCULATORS MAY BE USED. You will also have a periodic table, equation sheets, and the standard reduction potential table.

Clearly show the method used and the steps involved in arriving at your answers. It is to your advantage to do this, since you may obtain partial credit if you do and you will receive little or no credit if you do not. Attention should be paid to significant figures.

Note: For all questions, assume that the temperature is 298 K, the pressure is 1.00 atmospheres, and solutions are aqueous unless otherwise specified.

Record all your work on this exam; you will only be given credit for answers showing work.

NAME:					
PERIOD:	1	2	3	4	
January 10-12, 2006					
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Raw Score

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Version M

- (23 pts) When 10.000 g of a hydrocarbon is combusted, the combustion is incomplete, forming carbon dioxide, water, and carbon monoxide. The water is absorbed by calcium chloride in a dessicator, which gains 15.517 g in the process. The carbon dioxide is absorbed by lithium hydroxide, which gains 22.759 g.
 - a. (5 pts) What is the empirical formula of the unknown compound?

- b. (3 pts) At 25°C, 2.000 g of the compound is introduced to an empty 1.000-L flask. The pressure of the gas is 641 torr. What is the molecular mass of the compound?
- c. (3 pts) What is the molecular formula of the compound?
- d. (3 pts) Draw a Lewis structure for this compound and name it.
- e. (3 pts) Label the type of hybridization present in each carbon in your Lewis structure.
- f. (3 pts) How many sigma bonds are present in the molecule you have drawn in part d?
- g. (3 pts) How many pi bonds are present in the molecule you have drawn in part d?

- 2. (15 pts) Consider the J.J. Thomson model of the atom.
 - a. (3 pts) Briefly describe one aspect of Thomson's model that is now considered to be incorrect.

- b. (3 pts) Using the Bohr model of the atom, calculate the energy of light associated with an electron's transition from the first energy level to the third energy level in the hydrogen atom.
- c. (3 pts) Calculate the frequency of the light.
- d. (3 pts) Is light emitted or absorbed?
- e. (3 pts) In what region of the electromagnetic spectrum is the energy of light found? Briefly state two unique ways to determine this using the information in the problem.

- 3. (12 pts) Using basic principles of structure and bonding, explain the following differences, making sure to refer to each of the substances or situations.
 - a. (3 pts) KCl has a higher melting point than KI.

b. (3 pts) The first ionization energy of Ar is smaller than the first ionization energy of Ne.

c. (3 pts) The carbon-carbon bond energy in benzene is not equal to the bond energy associated with a carbon-carbon single bond, nor that of a carbon-carbon double bond.

d. (3 pts) A 0.10-molal aqueous solution of calcium hydroxide has a higher boiling point than a 0.10-molal aqueous solution of magnesium hydroxide.