AP Chem
Take Home Exam Ch 5 – 7
(40 pts)

Name: _____
I have neither given nor received aid on this exam, except from my group; list names if applicable:
Period: _____ Date: _____

Complete in pencil. Erase mistakes completely. If you need more space, use the back of this sheet or attach further sheets as is necessary. For problems involving calculations, no credit will be given if work is not shown. Round atomic masses on the Periodic Table to the hundredths place and then perform any calculations. Use the values of the constants listed below for calculations. Write your answers in the blanks provided.

$\Delta E = h\nu$ $c = \lambda\nu$ $E_n = \frac{-2.178 \times 10^{-18}}{n^2}$ joule $q = mc\Delta T$

$h = 6.63 \times 10^{-34}$ J s $c = 3.0 \times 10^{8}$ m s^{-1}

1. (8 pts) Given the following chemical reaction: $2Al(s) + Fe_2O_3(s) \rightarrow Al_2O_3(s) + 2Fe(s)$
   $\Delta H_f\, Fe_2O_3(s) = -822.2$ kJ/mol $\Delta H_f\, Al_2O_3(s) = -1669.8$ kJ/mol
   a. (3 pts) Calculate ΔH for this reaction.

$\Delta H =$ _____

   b. (5 pts) If the products absorb all the heat given off by reacting 1 mole of $Fe_2O_3(s)$, what would be the change in temperature if the reaction goes to completion? (Specific heat of $Al_2O_3(s) = 0.19$J/g°C and the specific heat of Fe(s) is 0.48 J/g°C)

$\Delta T =$ _____

2. (6 pts) The first line in the hydrogen spectrum is very difficult to see and it's the kind of light that causes skin cancer at great enough intensity. It is a dark purple color with a wavelength of 410.18 nm.
   a. (3 pts) Calculate the frequency of this light.

Freq = _____

   b. (3 pts) Calculate the change in energy that produces this color.

$\Delta E =$ _____

3. (8 pts) For the element Mo,
    a. (2 pts) What is one of the quantum number sets of the highest energy electron of Mo?

    b. (3 pts) What is the complete electronic configuration of Mo?

    c. (3 pts) The electronic configuration of Mo does not fit the normal pattern. How can this irregularity in the pattern be explained?

(18 pts) Fill in the blank <u>and</u> finish the statement in a sentence or two; you may also use sketches to help. (The answer because "that's the trend." will receive no credit; you must explain, briefly, why the trend is the way it is.)

4. Of the period 2 elements, ___ has the highest electron affinity because…

5. Of the alkali metals, element ___ has the lowest electron affinity because…

6. Of the halogen elements, ___ has the highest electronegativity because…

7. Of the period 4 elements, ___ has the lowest electronegativity because…

8. Of the period 3 elements, ___ has the largest <u>third</u> ionization energy because…

9. Of the alkaline earth elements, ___ has the lowest ionization energy because…

10. Of the chalcogen elements, ___ is the most metallic because…

11. Of the period 2 elements, ___ has the smallest radius because…

12. Of the noble gases, ___ has the largest radius because…