Name _____ AP Chemistry

HW 2: Due 12/19/14 Complete both free response questions. One will be graded. Show all work. Box and clearly label all final answers.

1.

	First Ionization Energy (kJ mol^{-1})	Second Ionization Energy (kJ mol^{-1})	Third Ionization Energy (kJ mol^{-1})
Element 1	**1314**	**3388**	**5301**
Element 2	**900**	**1757**	**14,849**
Element 3	**520**	**7298**	**111,815**
Element 4	**1681**	**3374**	**6050**

The table above shows the first three ionization energies for atoms of four elements from the second period of the periodic table. The elements are numbered randomly. Use the information in the table to answer the following questions.

(a) Which element is most metallic in character? Explain your reasoning.

(b) Identify element 2. Explain your reasoning.

(c) Write the equation for the ionization of atomic element 2 that requires 900 kJ mol^{-1}.

(d) Write the complete electron configuration for an atom of element 2.

(e) What is the expected oxidation state for the most common ion of element 3?

(f) What is the chemical symbol for element 3?

(g) A neutral atom of which of the four elements has the smallest radius?

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2. Suppose that a stable element with atomic number 119, symbol Pe, petrasium, has been discovered.
(a) Write the ground-state electron configuration for Pe, showing only the valence-shell electrons.
(b) Would Pe be a metal or a nonmetal? Explain in terms of electron configuration.
(c) On the basis of periodic trends, would Pe have the largest atomic radius in its group or would it have the smallest? Explain in terms of electronic structure.
(d) What would be the most likely charge of the Pe ion in stable ionic compounds?
(e) Write a balanced equation that would represent the reaction of Pe with water.
(f) Assume that Pe reacts to form a carbonate compound.
(i) Write the formula for the compound formed between Pe and the carbonate ion, CO_3^{2-}.
(ii) Predict whether or not the compound would be soluble in water. Explain your reasoning.

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