Unit 2 Free Response Questions

Your class will select three questions from the following set that you must answer. Your answer to each question is worth a maximum of ten points each. Points are earned in the following ways:

Up to 3 pts: English writing conventions – the student writes complete sentences with proper punctuation and grammar. The question is restated in the context of the answer.

Up to 4 pts: The answer addresses the question that was asked. Required examples, explanations and illustrations are provided, though they might not be correct.

Up to 3 pts: The answer is conceptually correct.

1. While writing <u>complete sentences</u>, identify each property below as more characteristic of a metal or a nonmetal.
    a. a gas at room temperature
    b. brittle
    c. malleable
    d. poor conductor of electric current
    e. shiny

2. What happens to atomic radius as you move down a group (family) of elements on the periodic table? Explain why the property changes in the way that it does.

3. Write the electron configuration for the element potassium, K (atomic #19). Explain in terms of its electron configuration why this element is never found pure in nature.

4. A coach tells an athlete to "get more potassium" to prevent cramps during exercise. The athlete, knowing that potassium is a very reactive metal, wants to know why it is safe to consume potassium in bananas and other food sources. Provide an explanation.

5. You have measured the mass and water displacement of several samples of an unknown metal. Your data is tabulated below.

Sample #	Mass (g)	Initial Volume (cm³)	Final Volume (cm³)
1	15.520	5.00	7.60
2	12.319	5.00	7.07
3	18.931	5.00	8.20

Which of these metals is your unknown? Support your answer with the calculations you did for the density of your unknown.

Metal	Density (g/cm³)
Titanium, Ti	4.51
Vanadium, V	6.00
Chromium, Cr	7.15

6. Orbital diagrams of two elements are shown below. Explain how you determine what is incorrect in each diagram. Then, ***explain and draw*** the correct diagrams for each element.

Nitrogen $\quad \downarrow\uparrow \quad \downarrow\uparrow \quad \downarrow\uparrow \quad \uparrow \quad \underline{}$

$\qquad\quad$ 1s $\qquad$ 2s $\qquad\qquad$ 2p

Magnesium $\quad \downarrow\uparrow \quad \downarrow\uparrow \quad \downarrow\uparrow \quad \downarrow\uparrow \quad \downarrow\uparrow \quad \underline{}$

$\qquad\qquad$ 1s $\qquad$ 2s $\qquad\qquad$ 2p $\qquad\qquad$ 3s