Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. (#2-1b) The atom above is most likely a (metal/non-metal) and will form a ____ ion?
   a. metal+/1  
   b. non-metal/-1  
   c. metal/+3  
   d. non-metal/-3

2. Which of the following statements is true
   I. The electron configuration for this atoms 1s²2s²2p⁶No
      Don't Know - so No
   II. The model is violating Hund's Rule.
   III. The model is indicating an atom in an excited state.

   a. I only  
   b. II only  
   c. III only  
   d. II and III only

3. (#2-3)

   Which of the following is the best reason that ionization energy generally increases from left to right across the second row of the periodic table?
   a. As the atomic number increases, the electrons are harder to remove.
   b. Ionization energy increases as the atomic number increases in a period.
   c. As the atomic number increases, more electrons are added to the atoms, thus increasing the electron-electron repulsions.
   d. More protons in the nucleus causes an increase in effective nuclear charge, making it harder to remove the electrons.

4. (#2-4) A particle is deflected though a magnetic field to determine the mass/charge ratio.
   a. Flame test  
   b. Photo electron spectroscopy  
   c. Infrared spectroscopy (IR)  
   d. Mass spectroscopy (mass spec)
Short Answer

1. For each of the following statements add a ( < > or <<>> ) indicate a reason why one atom is bigger/smaller. If possible explain in terms of coulombic attraction (Nuclear charge and or energy levels).
   a) Cl >> Ar  Argon is smaller due to more protons pulling with a greater coulombic force. (effective nuclear charge)
   b) Cl⁺ > Cl⁻  Cl⁻ is larger due to more electron repulsion
   c) Al << Ga  Ga is larger due to more electron levels

2. Answer the following questions relative to the Iron atom.
   a) To the right draw a Bohr diagram of the Fe atom and circle the electrons lost to form Fe²⁺.

   \[ \text{Phosphide gained 3 electrons in order to become an ion.} \]

   b) What element is Phosphide iso-electric with? Ar

   c) Write the equation for the reduction of P atom to the phosphide ion.

   \[ P + 3e^- \rightarrow P^{3-} \]

   d) Is Phosphide ion bigger or smaller then phosphorus atom? Why?

3. MgCl₂ tablet contains 1 Mg²⁺ for every 2 Cl⁻. For each of the following indicate if the statement is true or false. If wrong... Fix it to the best of your ability or make a statement that is correct.
   a. The proportions are correct.
   \[ \text{mgcl}_2 \text{ ratio} \quad \text{No should be twice} \]
   \[ \text{mgcl}_2 \text{ as many} \quad \text{cl}^- \]

   b. Sizes are correct.

   \[ \text{Yes, cl}^- \text{ has 1 more e}^- \text{ level} \]

4. Two make the following statements relative to the bond indicated, justify or nullify each statement.
   Student A: The bond indicated in the diagram is coulombic attraction.
   \[ \text{True} \]
   Student B: The bond indicated is not coulombic it is ionic.
   \[ \text{Nullify} \]

   \[ \text{Coulombic = Ionic} \]