

**Chemistry HP Final Exam Review Problem**

For the problems below, consider atoms of the following elements:

The diagram shows a periodic table grid with the following elements placed:

- Magnesium (Mg) with atomic number 12 in the second column, third row.
- Nitrogen (N) with atomic number 7 in the fifth column, second row.
- Chlorine (Cl) with atomic number 17 in the seventh column, third row.

- (1) Give the orbital notation for Nitrogen (N).
- (2) Give the electron configuration notation for Chlorine (Cl)
- (3) Give the noble gas notation for Magnesium (Mg).
- (4) Give the number of neutrons present in the isotope Fluorine-18 (F-18).
- (5) Match each element with the correct atomic radius. Explain your reasoning.

<b>Element</b>	<b>Atomic Radius (<math>\times 10^{-12}</math> m)</b>
(a) Fluorine	(i) 64
(b) Magnesium	(ii) 99
(c) Chlorine	(iii) 160

(6) The ionization energy for chlorine is 1255 kJ/mol. Would the ionization energy for fluorine be expected to be *greater than* or *less than* this value? Explain.

(7) Which of the atoms, nitrogen or fluorine, would have a higher electronegativity? Explain.

Name: \_\_\_\_\_ Per \_\_\_\_\_

(8) Which of the following correctly compares the sizes of the neutral atoms magnesium (Mg) and nitrogen (N) to their ions ( $\text{Mg}^{2+}$  and  $\text{N}^{3-}$ )?

- (a) N is larger than  $\text{N}^{3-}$  and Mg is larger than  $\text{Mg}^{2+}$
- (b)  $\text{N}^{3-}$  is larger than N and  $\text{Mg}^{2+}$  is larger than Mg
- (c)  $\text{N}^{3-}$  is larger than N and Mg is larger than  $\text{Mg}^{2+}$
- (d) N is larger than  $\text{N}^{3-}$  and  $\text{Mg}^{2+}$  is larger than Mg

(9) Consider the elements nitrogen and fluorine.

(i) Determine the number of atoms of each element needed to form a **covalent** bond. Draw the Lewis structures for this compound. Write the formula for the compound that forms and name the compound.

formula: \_\_\_\_\_ name: \_\_\_\_\_

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(ii) Classify the VSEPR Shape of this molecule: \_\_\_\_\_

(iii) Would the molecule be polar or non-polar?

(10) Consider the elements magnesium and nitrogen.

(i) Determine the number of atoms of each element needed to form an **ionic** bond. Draw the Lewis structures for each atom before the bond forms and after the bond forms. Use arrows to show the movement of electrons and indicate the charge of each ion. Write the formula for the compound that forms and name the compound.

formula: \_\_\_\_\_ name: \_\_\_\_\_

Before:	After:

Name: \_\_\_\_\_ Per \_\_\_\_\_

(ii) The above compound is formed when magnesium metal is combined with nitrogen gas. Write a balanced chemical equation for the reaction that occurs to form the compound.

(iii) A reaction is carried out in which 14.6 g of magnesium metal are combined with 9.50 g of nitrogen gas. The actual mass of the product obtained is 18.4 g, what is the percent yield for the reaction?