

I) Free response questions

1) Consider the atoms in Group 14 (IVA) from top to bottom (C to Pb): (12 points)

- Which has the largest radius?
- Which has the greatest 1st ionization energy?
- Which has the greatest electronegativity?
- Which shows the most *non*-metallic character?
- What are *two* metalloids?
- Draw the Lewis dot picture showing the valence electron configuration of C in the ground state.

2) Considering the elements in the third period (from Na to Ar): (8 points)

Answer questions a) through d) from the previous question for this row of elements.

a)_____ b)_____ c)_____ d)_____

3) Draw a Lewis structure for H_2CO that obeys the octet rule. (4 points)

4) Arrange in order of increasing lattice energy: KCl , KBr , MgO (2 points)

II) Multiple Choice Questions: 2 points Each. Select the best choice.

1) How many valence electrons are in each of the following atoms?

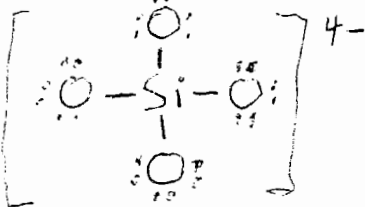


- A) 3, 6, 8, respectively
- B) 1, 4, 6, respectively
- C) 1, 2, 2, respectively
- D) 3, 4, 2, respectively
- E) 1, 2, 4, respectively

2) Which one of the following bonds is **NOT** polar?

- A) Cl-Cl
- B) B-Cl
- C) Hg-Sb
- D) C-S
- E) B-As

3) Calculate the **FORMAL CHARGE** on the Si atom and each O atom in SiO_4^{4-} , where Si is the central atom



- A) Si: 0; each O: 0
- B) Si: 0; each O: -1
- C) Si: 0; each O: -4
- D) Si: -1; each O: 0
- E) Si: -4; each O: 0

4) Which pair of atoms and/or ions **does not** show a correct size relationship?

- a. $\text{K} > \text{K}^+$
- b. $\text{Na} > \text{Al}$
- c. $\text{Cl}^- > \text{Cl}$
- d. $\text{Ar} > \text{Ne}$
- e. $\text{Ar} > \text{Na}$

5) Which of the following sets of isoelectronic ions/atoms are arranged in order of increasing atomic radii (starting with the smallest)?

- a. $\text{Li}^+, \text{Be}^{2+}, \text{B}^{3+}$
- b. $\text{O}^{2-}, \text{F}^-, \text{Ne}$
- c. $\text{S}^{2-}, \text{Cl}^-, \text{Ar}$
- d. $\text{K}^+, \text{Ca}^{2+}, \text{Sc}^{3+}$
- e. $\text{Al}^{3+}, \text{Mg}^{2+}, \text{Na}^+$