

Name _____

1. Rank the following in terms of size of atomic radii. 4 is biggest, 1 is smallest. Looking at the periodic table should be enough. [2 pts]

1	Rn
4	Cs
2	Tl
3	Ba

2. Pick the **atom** that is isoelectronic with the ion for the two ions below. [4 pts]

Cl	S ⁻
Ne	Na ⁺

larger Is the ionic radius (size) of S⁻ larger or smaller than the parent atom (S)?

smaller Is the ionic radius (size) of Na⁺ larger or smaller than the parent atom (Na)?

3. Consider the ionization energies (in kJ/mol) listed for the fictitious element FF. Use the energies to answer the following questions.

	I_1	I_2	I_3	I_4	I_5	I_6
FF	1,086	2,353	4,621	6,223	38,000	47,261

- a) How many valence electrons does FF have? [2 pts]

4 valence electrons (large jump in ionization energy from I_4 to I_5 .)

- b) Choose the correct electron configuration for element FF. [2 pts]

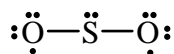
- 1) [noble gas] $ns^2 np^1$ 2) [noble gas] $ns^2 np^4$ 3) [noble gas] $ns^2 np^2$
4) [noble gas] nd^4 5) [noble gas] $ns^2 np^3$

4. Order the following from lowest **electronegativity** (1) to highest **electronegativity** (4). [2 pts]

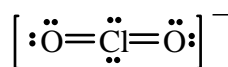
second least electronegative	Mg
least electronegative	Na
most electronegative	B
second most electronegative	Al

5. Decide whether the drawings, shown below, are acceptable Lewis diagrams for the species indicated. Answer **yes** for acceptable, **no** for unacceptable. [4 pts]

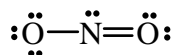
Lewis structure of SO_2 ?



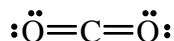
Lewis structure of ClO_2^- ?



Lewis structure of NO_2 ?



Lewis structure of CO_2 ?



6. Consider an element (X) with a valence electron configuration of $ns^2 np^4$. What is the most likely formula of the ionic compound formed between this element and potassium (K)? **SHOW WORK** [3 pts]

Because X has the electron configuration $ns^2 np^4$, it will accept two electrons when reacting with a metal to form an ionic compound. By gaining two electrons, it will achieve a noble gas configuration. Because X forms a -2 ion and K forms a $+1$ ion, the formula of the ionic compound formed between these two elements will be:



7. **True or False** [5 pts]

a) A Na-Cl bond has more ionic character compared to a Na-F bond.

FALSE, the difference in electronegativity is greater for the Na-F bond.

b) The bond in O_2 would be classified as pure covalent (nonpolar covalent).

TRUE

c) Nitrogen (N) has a larger ionization energy than oxygen (O).

TRUE (This is an exception to the ionization energy trend.)

d) Ca^{2+} has a larger radius than P^{3-} .

FALSE (These ions are isoelectronic.)

e) The electron configuration for Ti^{2+} is $[\text{Ar}]4s^2$.

FALSE, the correct electron configuration is $[\text{Ar}]3d^2$.

8. Write the best Lewis structure for the following molecules:
[6 pts]

Molecule	No. of valence electrons	Lewis Structure
PCl_3	26	$\begin{array}{c} \text{:}\ddot{\text{Cl}}\text{---}\ddot{\text{P}}\text{---}\ddot{\text{Cl}}\text{:} \\ \\ \text{:}\ddot{\text{Cl}}\text{:} \end{array}$
CO_3^{2-}	24	$\left[\begin{array}{c} \text{:}\ddot{\text{O}}\text{---}\text{C}=\ddot{\text{O}} \\ \\ \text{:}\ddot{\text{O}}\text{:} \end{array} \right]^{2-}$