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**Chapters 6 and 7 Practice Worksheet:
Covalent Bonds and Molecular Structure**

- 1) How are ionic bonds and covalent bonds different?

- 2) Describe the relationship between the length of a bond and the strength of that bond.

- 3) Identify the type(s) of bond(s) found in the following molecules:
 - a. CCl_4 _____
 - b. Li_2O _____
 - c. NF_3 _____
 - d. CaSO_4 _____
 - e. SO_2 _____
 - f. $\text{Mg}(\text{OH})_2$ _____

- 4) Define electronegativity.

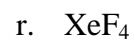
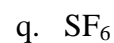
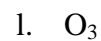
- 5) Use electronegativity values to place the following elements in **increasing** order: F, N, H, P, Si, C, O

- 6) Determine if the bond between atoms in each example below is nonpolar covalent, polar covalent, or ionic.
 - a. H-H _____
 - b. P-Cl _____
 - c. F-F _____
 - d. Na-Br _____
 - e. N-F _____
 - f. Mg-O _____
 - g. C-H _____
 - h. H-Cl _____

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7) Draw Lewis Structures for the following molecules:



8) Which of the compounds or ions in problem 7 require resonance structures to describe the structure properly? Draw them and include formal charges for each atom in your drawings.

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9) Which of the compounds or ions in problem 7 are exceptions to the octet rule?

10) Fill in the table below to determine the molecular geometry for the following molecules:

Formula	ABE formula	Number of e ⁻ domains on central atom	# e ⁻ domains / # non-bonding domains on central atom	Electron-Domain Geometry (name)	Molecular Geometry (name)	Bond angle(s) on central atom
CO ₂						
BeCl ₂						
H ₂ O						
BF ₃						
CCl ₄						
NH ₃						
NO ₃ ⁻						
SO ₃						
SO ₃ ²⁻						
NF ₃						

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Formula	ABE formula	Number of e⁻ domains on central atom	# e⁻ domains/ # non-bonding domains on central atom	Electron-Domain Geometry	Molecular Geometry (name)	Bond angle(s) on central atom
CO						
O₃						
CO₃²⁻						
SO₂						
PF₅						
SF₄						
SF₆						
XeF₄						

11) a. Identify the molecules in the table above that are polar.

12) For XeO₃, some people prefer to draw a Lewis Dot Structure that obeys the octet rule. Others prefer to draw resonance structures that have lower formal charges. Draw eight resonance forms for xenon trioxide and indicate the formal charges on each atom in each resonance form. There is not a “right” resonance form, but some are arguably better than others.

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13) Indicate the hybridization of the **central atom**. Also indicate the **total number** of sigma (σ) and pi (π) bonds in the following molecules and ions.

Formula	Hybridization of central atom	# of σ bonds	# of π bonds
CO ₂			
BeCl ₂			
H ₂ O			
BF ₃			
CCl ₄			
NH ₃			
NO ₃ ⁻			
SO ₃			
SO ₃ ²⁻			
NF ₃			
CO			
O ₃			
CO ₃ ²⁻			
SO ₂			
PF ₅			
PCl ₅			
SF ₆			
TeF ₆			