Mole, Bonding, & Naming Practice Name:_____ Block:_____

Part I: Solve each problem. Clearly show all your work. Round answers to the correct number of significant figures and include appropriate units.

1. How many moles of SO_2 are in 2.12 grams of SO_2?

$$2.12\text{ g } SO_2 \left| \frac{1\text{ mole}}{64.07\text{ g } SO_2} \right. = 0.0331\text{ mole } SO_2$$

2. How many grams of C_2H_6 are in 5.02 moles of C_2H_6?

$$5.02\text{ moles } C_2H_6 \left| \frac{30.08\text{ g } C_2H_6}{1\text{ mole } C_2H_6} \right. = 151\text{ g } C_2H_6$$

3. How many particles of NO_2 gas are in 41.9 grams of NO_2 gas?

$$41.9\text{ g } NO_2 \left| \frac{1\text{ mole } NO_2}{46.01\text{ g } NO_2} \right| \frac{6.02\times10^{23}\text{ particle } NO_2}{1\text{ mole } NO_2} = 5.48\times10^{23}\text{ particles } NO_2$$

4. How many particles of potassium oxide are in 2.0 moles of K_2O?

$$2.0\text{ mole } K_2O \left| \frac{6.02\times10^{23}\text{ particle } K_2O}{1\text{ mole } K_2O} \right. = 1.2\times10^{24}\text{ particle } K_2O$$

5. How many grams of lithium bromide are in 8.04×10^{24} particles of $LiBr_2$?

$$8.04\times10^{24}\text{ particle LiBr} \left| \frac{1\text{ mole LiBr}}{6.02\times10^{23}\text{ particle LiBr}} \right| \frac{86.84\text{ g LiBr}}{1\text{ mole LiBr}} = 1{,}160\text{ g LiBr}$$

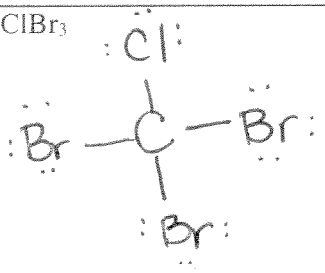
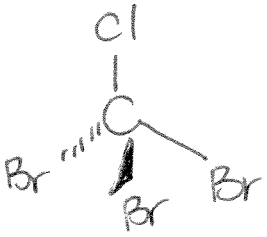
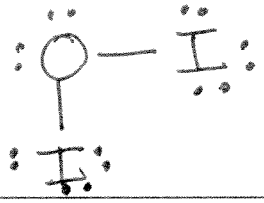
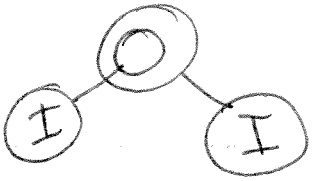
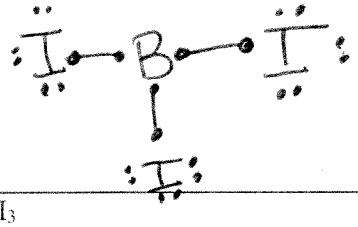
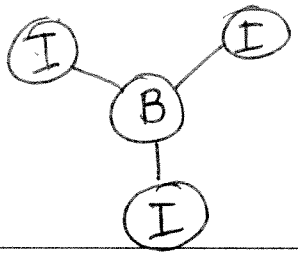
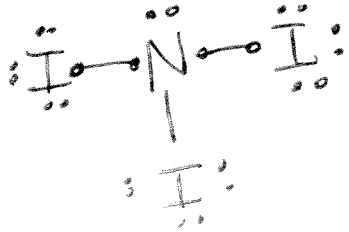
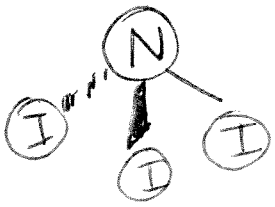
6. How many grams of dinitrogen tetroxide gas are in 4.3×10^{26} molecules of dinitrogen tetroxide gas?

$$4.3\times10^{26}\text{ molecule } N_2O_4 \left| \frac{1\text{ mole } N_2O_4}{6.02\times10^{23}\text{ molecule } N_2O_4} \right| \frac{92.02\text{ g } N_2O_4}{1\text{ mole } N_2O_4} = 6.6\times10^{4}\text{ g } N_2O_4$$

7. How many particles of calcium hydroxide are in 3.99 grams of calcium hydroxide?

$$3.99\text{ g } Ca(OH)_2 \left| \frac{1\text{ mole } Ca(OH)_2}{74.10\text{ g } Ca(OH)_2} \right| \frac{6.02\times10^{23}\text{ particle } Ca(OH)_2}{1\text{ mole } Ca(OH)_2} = 3.24\times10^{22}\text{ particle } Ca(OH)_2$$

Part II: Draw the Lewis Dot Structure & Shape of each molecule below. (See notes for help).

	Lewis Structure	# boding e⁻ conc.	# lone e⁻ pairs	Total e⁻ conc.	Picture of Shape (molecular geometry)	Shape Name
1.	O_2 	1	/	1		Linear
2.	N_2 	1	/	1		Linear
4.	SiS_2 	2	/	2		Linear
5.	$CClBr_3$ 	4	/	4		Tetrahedral
6.	OI_2 	2	2	4		Bent
7.	BI_3 (boron is an exception: only needs 6 valence e⁻) 	3	/	3		Trigonal Planar
8.	NI_3 	3	1	4		Pyramidal

Part III: Determine the electronegativity difference (ΔEN) (use your yellow tables) between the two atoms and predict the type of bond that will form (ionic, polar covalent, or nonpolar covalent).

1. N – H (N) 3.0 – 2.1 (H) = 0.9 polar Bond
2. Si – O (O) 3.5 – 1.8 (Si) = 1.7 polar Bond
3. S – Cl (Cl) 3.0 – 2.5 (S) = 0.5 polar Bond
4. Na – Cl (Cl) 3.0 – 0.9 (Na) = 2.1 Ionic Bond

Part IV: *First determine the type of bond, then write the names of the following chemical compounds:*

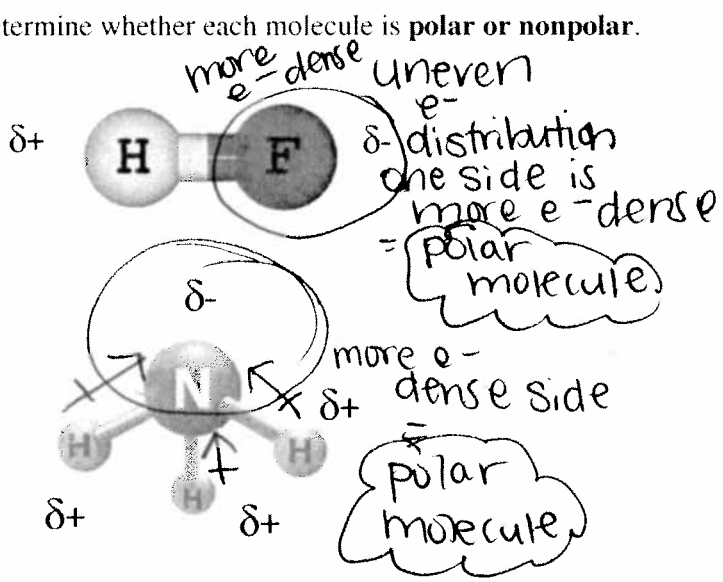
1) P_2O_5 diphosphorous pentaoxide
2) $CaSO_4$ Calcium Sulfate
3) C_2Br_6 dicarbon hexabromide
4) $Cr(CO_3)_3$ Chromium (VI) Carbonate
5) Ag_3P silver phosphide
6) IO_2 Iodine dioxide
7) VO_2 vanadium (IV) oxide
8) PbS lead (II) Sulfide

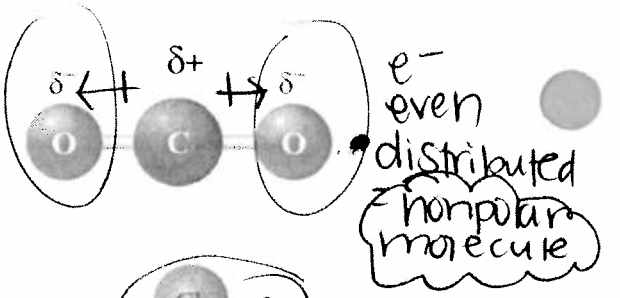
Part V: *Determine the type of bond, then write the formulas of the following chemical compounds:*

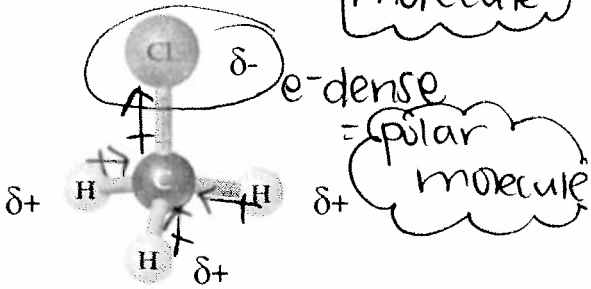
1) tetraphosphorus triselenide P_4Se_3
2) potassium acetate $K C_2H_3O_2$
3) iron (II) phosphide Fe_3P_2
4) disilicon hexabromide Si_2Br_6
5) titanium (IV) nitrate $Ti(NO_3)_4$
6) copper (I) phosphate Cu_3PO_4
7) gallium oxide Ga_2O_3
8) tetrasulfur dinitride S_4N_2

Part VI: Molecular Polarity and Solubility

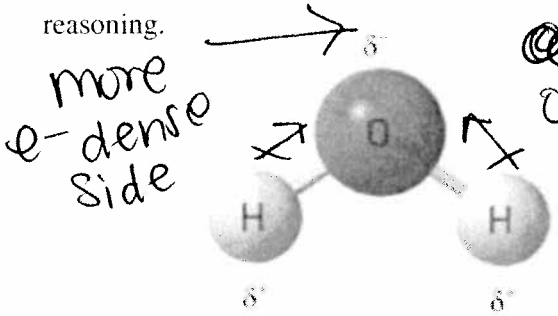
1. Determine whether each molecule is **polar or nonpolar**.





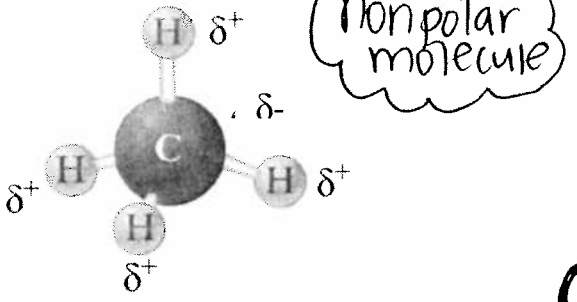


2. Examine the three molecules of water below. Determine whether water is polar or nonpolar. Explain your reasoning.

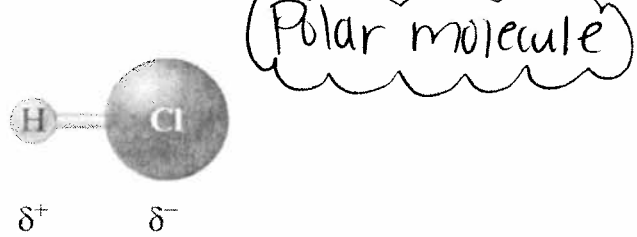


oxygen is more electro neg. thus stronger making that side of the molecule more e- dense thus a polar molecule

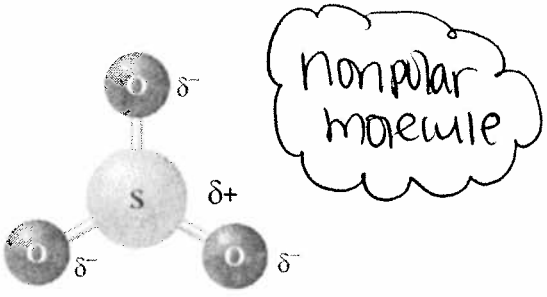
3. Determine whether each molecule is **polar or nonpolar**. Then circle **ALL** molecules ~~that would~~ be soluble (i.e. dissolve) in water.



a)



b)



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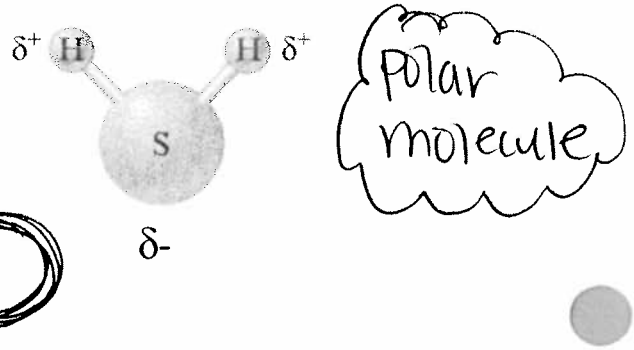

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