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? $MM_{SO_2} = (32.07) + (2)(16) = 64.07 \frac{g}{mol}$

$$2.12\ g\ SO_2 \left| \frac{1\ mol\ SO_2}{64.07\ g\ SO_2} \right. = 0.0331\ mol\ SO_2 \text{ or } 3.31 \times 10^{-2}\ mol\ SO_2$$

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

$MM_{C_2H_6} = (2)(12.01) + (6)(1.01) = 30.08\ g/mol$

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

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

$MM_{NO_2} = (14.01) + (2)(16) = 46.01\ g = 1\ mol\ NO_2 = 6.02 \times 10^{23}$ particles NO_2

$$41.9\ g\ NO_2 \left| \frac{1\ mol\ NO_2}{46.01\ g\ NO_2} \right| \frac{6.02 \times 10^{23}\ particles\ NO_2}{1\ mol\ NO_2} = 5.48 \times 10^{23}\ particles\ NO_2$$

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

$1\ mol\ K_2O = 6.02 \times 10^{23}$ particles K_2O

$$2.0\ mol\ K_2O \left| \frac{6.02 \times 10^{23}\ particles\ K_2O}{1\ mol\ K_2O} \right. = 1.2 \times 10^{24}\ particles\ K_2O$$

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

$1\ mol\ LiBr = 6.02 \times 10^{23}$ particles $LiBr = 86.84\ g\ LiBr$

$$8.04 \times 10^{24}\ particles\ LiBr \left| \frac{1\ mol\ LiBr}{6.02 \times 10^{23}\ particles\ LiBr} \right| \frac{86.84\ g\ LiBr}{1\ mol\ LiBr} = 1.16 \times 10^{3}\ g\ LiBr$$

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

$1\ mol\ N_2O_4 = 6.02 \times 10^{23}$ molecules $N_2O_4 = 92.02\ g\ N_2O_4$

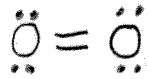
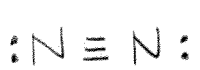
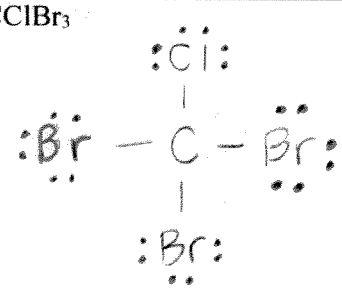
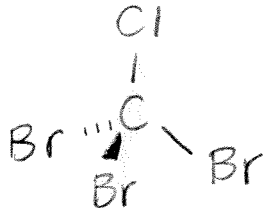
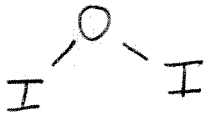
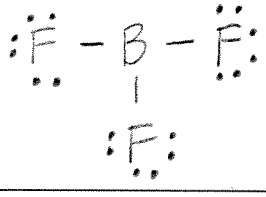
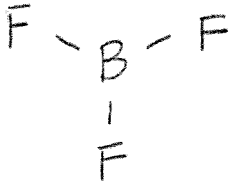
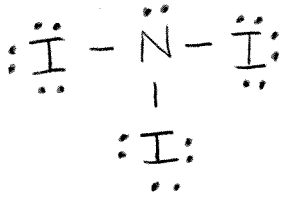
$$4.3 \times 10^{26}\ molecules\ N_2O_4 \left| \frac{1\ mol\ N_2O_4}{6.02 \times 10^{23}\ molecules\ N_2O_4} \right| \frac{92.02\ g\ N_2O_4}{1\ mol\ N_2O_4} = 6.6 \times 10^{2}\ g\ N_2O_4$$

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

$1\ mol\ Ca(OH)_2 = 6.02 \times 10^{23}$ particles $Ca(OH)_2 = 74.1\ g\ Ca(OH)_2$

$$3.99\ g\ Ca(OH)_2 \left| \frac{1\ mol\ Ca(OH)_2}{74.1\ g\ Ca(OH)_2} \right| \frac{6.02 \times 10^{23}\ particles\ Ca(OH)_2}{1\ mol\ Ca(OH)_2} = 3.24 \times 10^{22}\ Particles\ Ca(OH)$$

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

	Lewis Structure	# bonding e^- conc.	# lone e^- pairs	Total e^- conc.	Picture of Shape (molecular geometry)	Shape Name
1.	O_2 	1	0	1	O–O	linear
2.	N_2 	1	0	1	N – N	linear
4.	SiS_2 	2	0	2	S – Si – S	linear
5.	$CClBr_3$ 	4	0	4		tetra-hedral
6.	OI_2 	2	2	4		Bent
7.	BI_3 (boron is an exception: only needs 6 valence e^-) 	3	0	3		trigonal planar
8.	NI_3 	3	1	4		trigonal pyramidal

Part III: Determine the electronegativity difference (ΔEN) (use your ~~yellow~~ pink 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 H=2.1 ΔEN = 3-2.1 = 0.9 polar covalent

2. Si – O Si = 1.8 O=3.5 ΔEN = 3.5 - 1.8 = 1.7 = polar covalent

3. S – Cl S=2.5 Cl=3 ΔEN = 3-2.5=0.5 = Polar covalent

4. Na – Cl Na=0.9 Cl=3 ΔEN = 3 - 0.9 = 2.1 = Ionic

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

1) P_2O_5 diphosphorus pentoxide

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 $KC_2H_3O_2$

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