Chem 1121
Spring 2012
Exam 3A

Name:_____

Show all work to receive credit. You must use the factor-label (conversion-factor) method for all conversions. Be sure to show all units and write your answers using the correct number of significant figures or decimal places.

Q1. [6 pts.] Predict whether the following bonds will be POLAR or NON-POLAR. Explain how you determined your answers.

a) C—H

b) F—F

c) C—O

Q2. [20 pts.] Predict whether CF_4 will be POLAR or NON-POLAR. Your answer should include a valid Lewis structure, a sketch of the molecular geometry, bond dipole-moments, and the overall dipole-moment.

Q3. [5 pts.] Explain what the phrase: *like dissolves like* means. Give examples.

Q4. [22 pts.] Balance the following chemical equations using the lowest whole number coefficients:

a) $\_\_H_2SO_4 + \_\_KOH \rightarrow \_\_K_2SO_4 + \_\_H_2O$

b) $\_\_NaClO_3 \rightarrow \_\_NaCl + \_\_O_2$

c) $\_\_O_2 + \_\_C_4H_8O \rightarrow \_\_CO_2 + \_\_H_2O$

Q5. [15 pts.] Calculate the molar mass of the following substances:

a) CS_2

b) $C_6H_4N_2O_4$

c) $Ca_3(PO_4)_2$

Q6. [12 pts.] Using your answers to the previous question:
(Note: you must use the conversion-factor / factor-label method to receive full credit for this question!)

a) What mass would 0.39 mol of CS_2 weigh?

b) How many moles of $C_6H_4N_2O_4$ are there in a 139 g sample of this compound?

c) What mass would 0.092 mol of $Ca_3(PO_4)_2$ weigh?

Q7. [20 pts.] Given the following balanced chemical equation:
(Note: you must use the conversion-factor / factor-label method to receive full credit for this question!)

$$2NaCl + F_2 \rightarrow 2NaF + Cl_2$$

a) How many moles of Cl_2 can be formed from 0.42 mol NaCl?

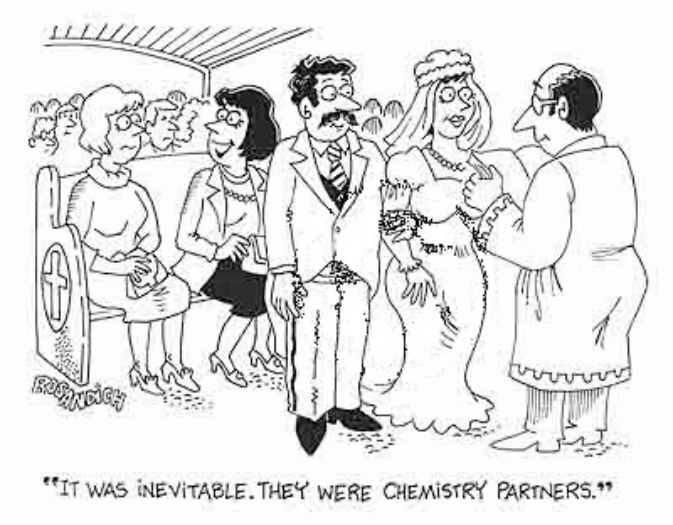
b) What mass in grams of Cl_2 can be formed from 0.42 mol NaCl?

c) What mass in grams of Cl_2 can be formed from 13.4 g NaCl?

d) If 3.51 g of Cl_2 is made from 13.4 g of NaCl, then what is the percent yield?
(Note: you should be using your answer to part c to answer this question.)

BONUS Question:

Given that the X—Y bond is polar, then *explain* how you can tell whether XY_3 is trigonal planar or trigonal pyramidal if you were told that XY_3 is polar!



Periodic Table

1 IA												13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1 **H** 1.01	2 IIA																2 **He** 4.00
3 **Li** 6.94	4 **Be** 9.01											5 **B** 10.81	6 **C** 12.01	7 **N** 14.01	8 **O** 16.00	9 **F** 19.00	10 **Ne** 20.18
11 **Na** 22.99	12 **Mg** 24.31	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB	13 **Al** 26.98	14 **Si** 28.09	15 **P** 30.97	16 **S** 32.07	17 **Cl** 35.45	18 **Ar** 39.95
19 **K** 39.1	20 **Ca** 40.08	21 **Sc** 44.96	22 **Ti** 47.88	23 **V** 50.94	24 **Cr** 52.00	25 **Mn** 54.94	26 **Fe** 55.85	27 **Co** 58.93	28 **Ni** 58.69	29 **Cu** 63.55	30 **Zn** 65.39	31 **Ga** 69.72	32 **Ge** 72.61	33 **As** 74.92	34 **Se** 78.96	35 **Br** 79.90	36 **Kr** 83.80
37 **Rb** 85.47	38 **Sr** 87.62	39 **Y** 88.91	40 **Zr** 91.22	41 **Nb** 92.91	42 **Mo** 95.94	43 **Tc** (98)	44 **Ru** 101.07	45 **Rh** 102.91	46 **Pd** 106.42	47 **Ag** 107.87	48 **Cd** 112.41	49 **In** 114.82	50 **Sn** 118.71	51 **Sb** 121.76	52 **Te** 127.6	53 **I** 126.9	54 **Xe** 131.29
55 **Cs** 132.9	56 **Ba** 137.3	57 **La*** 138.9	72 **Hf** 178.5	73 **Ta** 180.9	74 **W** 183.9	75 **Re** 186.2	76 **Os** 190.2	77 **Ir** 192.2	78 **Pt** 195.1	79 **Au** 197.0	80 **Hg** 200.6	81 **Tl** 204.4	82 **Pb** 207.2	83 **Bi** 209	84 **Po** (209)	85 **At** (210)	86 **Rn** (222)
87 **Fr** (223)	88 **Ra** (226)	89 **Ac^** (227)	104 **Rf** (261)	105 **Db** (262)	106 **Sg** (263)	107 **Bh** (264)	108 **Hs** (265)	109 **Mt** (268)	110 **Ds** (271)	111 **Rg** (272)							

*	58 **Ce** 140.1	59 **Pr** 140.9	60 **Nd** 144.2	61 **Pm** (145)	62 **Sm** 150.4	63 **Eu** 152.0	64 **Gd** 157.3	65 **Tb** 158.9	66 **Dy** 162.5	67 **Ho** 164.9	68 **Er** 167.3	69 **Tm** 168.9	70 **Yb** 173.0	71 **Lu** 175.0
^	90 **Th** 232.0	91 **Pa** (231)	92 **U** 238.0	93 **Np** (237)	94 **Pu** (244)	95 **Am** (243)	96 **Cm** (247)	97 **Bk** (247)	98 **Cf** (251)	99 **Es** (252)	100 **Fm** (257)	101 **Md** (258)	102 **No** (259)	103 **Lr** (260)