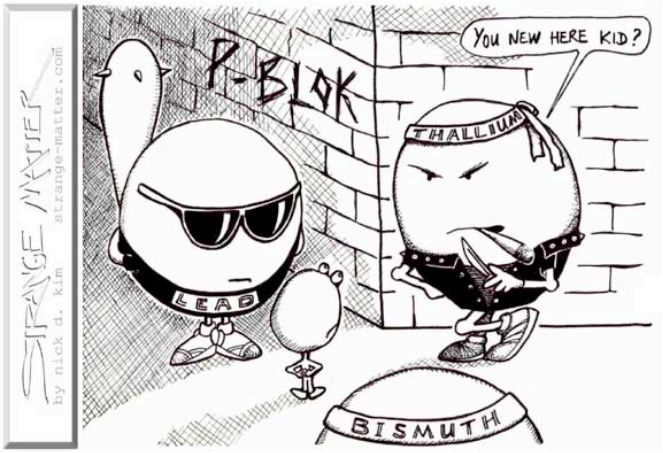
Chemistry 121
Spring 2007
Exam 2

Name:_____

Take a deep breath, and relax! First, answer the questions you know how to do and then work on the more difficult problems. Don't forget to show all your work, so I can give you as much credit as possible.

Good Luck!

Andy



Unwittingly, and against his mother's advice, Vince the first-row Transition Metal had been lured far away from home, and now found himself surrounded by heavier elements of the P-block.

Q1. Fill in the blanks: (15 pts.)

Name	Formula
Nitrate ion	
Sulfate ion	
Carbonate ion	
Bicarbonate ion	
Ammonium ion	
	NO_2^-
	SO_3^{2-}
	$H_2PO_4^-$
	PO_4^{3-}
	OH^-

Q2. Write the formula for the following compounds: (15 pts.)
a) sodium iodide

b) potassium nitride

c) iron(II) chloride

d) dinitrogen heptoxide

e) sodium sulfate

f) ammonium sulfide

g) pentachlorine octoxide

h) copper(I) acetate

i) tetraboron decafluoride

j) lithium oxide

Q3. What is meant by the term, *valence electrons?* How many valence electrons does an atom of carbon have? (5 pts.)

Q4. Name the following compounds: (15 pts.)

a) $MgCl_2$

b) $NaNO_3$

c) N_2Cl_6

d) $CaSO_4$

e) P_2O_5

f) $CuBr_2$

g) Cl_2O

h) NH_4F

i) Li_2SO_3

j) Fe_2O_3

Q5. Write a valid Lewis structure for the following compounds: (15 pts.)

a) CCl_4

b) NF_3

c) SO_2

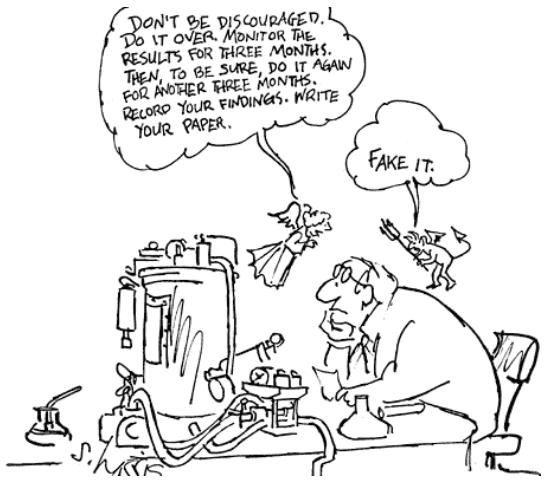
Q6. Using VSEPR theory, predict the shape of NCl_3. Your answer should include: (16 pts.)

☐ A valid Lewis structure ☐ a sketch of the geometry

☐ the name of the molecular geometry, and ☐ approximate bond angles

Q7. Which bond is more polar, C—F or N—F? Explain why. (4 pts.)

Q8. Predict whether F_2O will be polar or non-polar. Be sure to show all working, including a valid Lewis structure, a sketch of the approximate geometry, and any other necessary information. (15 pts.)



Useful Information

Periodic Table of the Elements

IA	IIA											IIIA	IVA	VA	VIA	VIIA	VIIIA
1																	*18*
1 H 1.01	*2*											*13*	*14*	*15*	*16*	*17*	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*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	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 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	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 74.92160	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 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba* 137.33	71 Lu 174.97	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.20	83 Bi 208.98	84 Po [210]	85 At [210]	86 Rn [222]
87 Fr [223]	88 Ra** [226]	103 Lr [262]	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [264]	108 Hs [265]	109 Mt [268]	110 [269]	111 [272]	112 [277]	113	114 [285]	115	116 [289]	117	118 [293]

*	57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm [145]	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04
**	89 Ac [227]	90 Th 232.04	91 Pa 231.04	92 U 238.03	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]