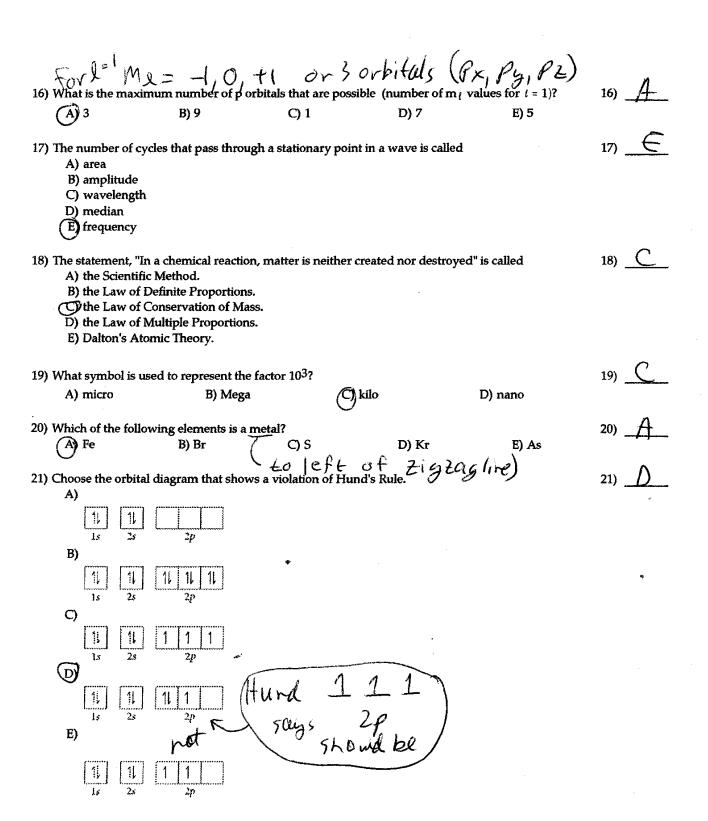
NT	e Key (print) Name	(sign)
Name	e(print) Name	(Sign)
Multip I obv and cl	se show work for partial credit and full credit on the Long Answers and in som iple choice questions have no partial credit. Please write anything you want g viously cannot grade it. (2 pts print and sign exam) If you run out of space, clearly tell me where the remaining answer can be found. If you don't tell me	graded legibly. If I cannot read your wor please continue on the scratch paper page to look on the scratch paper for
	vers, I will not even look at the scratch paper. (Avogadro's number = 6.022 vin = ${}^{\circ}$ C + 273.15)(PV=nRT, R = 0.08206 (L atm)/(mol K)) [(P2V2) / (P1 V1)	
	u are a graduating senior, please circle (graduating senior) here so uation.	o that I submit your grades on time for
	I MULTIPLE CHOICE. Choose the one alternative that best completes the partial credit for MC. (2 pts per question, ## pts total)	e statement or answers the question.
	1) How many H+ ions can the acid, H3PO4, donate per molecule? A) 1 B)3 C) 0	1) <u>B</u>
	2) A cation of +2 indicates that an element has A) gained two protons. B) gained two electrons. C) lost two electrons. D) lost two protons. E) lost two neutrons.	
		t Zero
	 4) A substance that can't be chemically broken down into simpler substance A) a heterogeneous mixture. B) an element. C) a homogeneous mixture. D) an electron. E) a compound. 	es is 4) 1
	5) Identify the compound with covalent bonds. A) Li B) KBr C) Kr D) CH4 We falls (a) C (b) In which orbital below would an electron (on average) be closest to the many of the covalent of	alent ionic -
	7) Iodine belongs to the group of the periodic table. A) alkali metal B) halogen C) alkaline earth metal D) noble gas	7) <u>(</u>

		" C
8) Ag is an example of	D) - L	8)
A) a compound.	B) a homogeneous mixture.	
an element.	D) a heterogeneous mixture.	
0.01 1 (17.00		01
9) Give the name for H ₂ SO ₄ .		9)
A) hyposulfurous acid		
B) persulfuric acid		
sulfuric acid		
D) persulfurous acid		
E) sulfurous acid		
10) TATL: 1 - Cd- C-11	2	10)
10) Which of the following exists as a diatomic molecule	ı	10)
A) lithium (B))hydrogen		
C) krypton		
D) phosphorus		
E) carbon	<i>;</i>	
L) Carbon		
11) Give the net ionic equation for the reaction (if any)	hat occurs when aqueous solutions of HoSOA	11) A
		, _
$\Omega \subseteq I$	d + base is alway	
$(A) H^{+}(aq) + OH^{-}(aq) \rightarrow H_{2}O(1)$	lit in a second	
B) $H_2^{2+}(aq) + OH^{-}(aq) \rightarrow H_2(OH)_2(1)$	H++04->40	
C) H ⁺ (aq) + OH ⁻ (aq) + 2 K ⁺ (aq) + SO_4^{2-} (aq) $\rightarrow 3$	H2O(1) + K2SO4(s) Net 10016	
D) $2 K^{+}(aq) + SO_4^{2-}(aq) \rightarrow K_2SO_4(s)$	reconte	
E) No reaction occurs.		
L) No reaction occurs.		
12) Which one of the following compounds is insoluble it	n water?	12)
A) K2CO3 B) NaNO3	(C) Pb Cl ₂ D) Ca Cl ₂	,
11) N2CO3	6) 17 (2)	
100 5 4 4 1 6 16 1		10)
13) Describe the shape of a p orbital.	The separate of the second	13) <u>[]</u>
A) four balls P) and order!	ot expand octet be	
B) spherical C) three balls	1 and a cotat be	
(D) dumbbell shaped	et expand our	
E) eight balls	d orbitals available)	•
2) cagain source	a ornar	
14) Which element can expand its valence shell to accom	modate more than eight electrons?	14)
		11)
geriod 2nd period	C) He 1st ponul D) O 2 Wd	
15) An ionic bond is best described as	<i>Periol</i>	15)
A) the attraction between 2 metal atoms.	•	20)
B) the attraction that holds the atoms together in a	polyatomic ion.	
C) the attraction between 2 nonmetal atoms.	. ,	
D) the sharing of electrons.		
E) the transfer of electrons from one atom to anoth	ner.	



22)

22) Give the temperature and pressure at STP (standard pressure and atmosphere).

- A) 0K and 1.00 atm
- (B) 0°C and 1.00 atm
- C) 32K and 1 torr Hg
- D) 0°C and 1 mm Hg
- E) 25°C and 1.00 in Hg

<u>Part II Short Answer</u>: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (86 pts)

From the given list, circle all compounds. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (8 pts, 2 pts each)

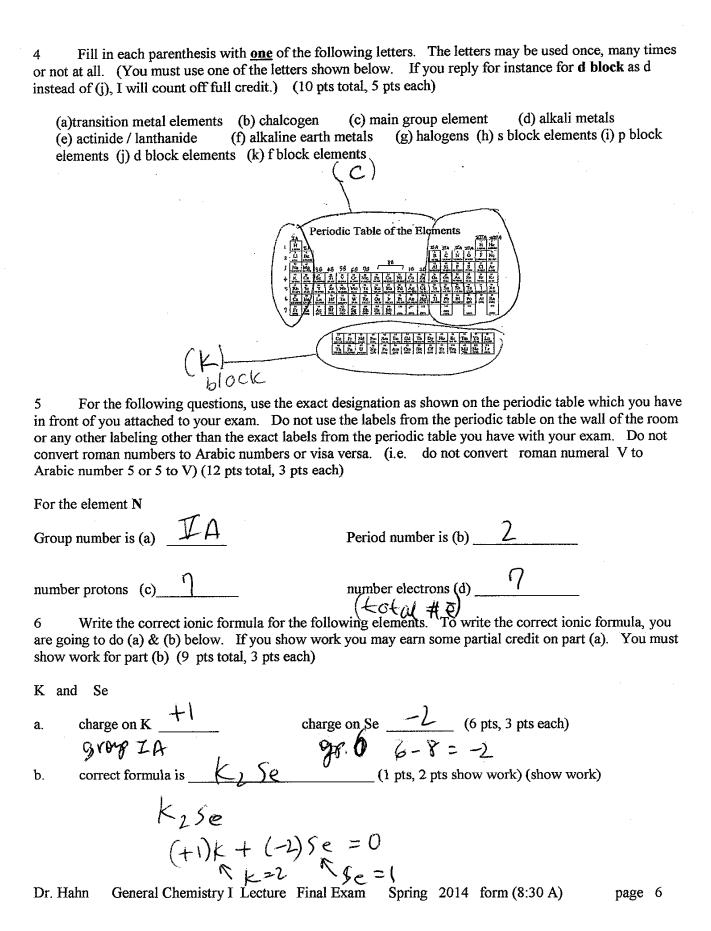
CH ₃ CH ₃	O_2	Fe	(NiCl ₂)
CHICHI	02	re	TVICI2

2. From the list of molecules shown below circle all ionic compounds. I am asking you to circle (or to not circle) the entire compound not parts of a compound formula. (8 pts, 2 pt each)



For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

Fe	oxygen	
----	--------	--



7 a. Balance the following reaction by filling in the blanks. The blanks cannot be filled with a zero. You may leave the blank empty which means the number one goes in the blank. (3 pts per blank)

$$2 H_2S(g) + 3 O_2(g) \rightarrow 2 SO_2(g) + 2 H_2O(g)$$

b. Please show how many of each type of atom is in both sides of the equation after you complete balancing the reaction. (6 pts)

atoms in reactant side

atoms on product side

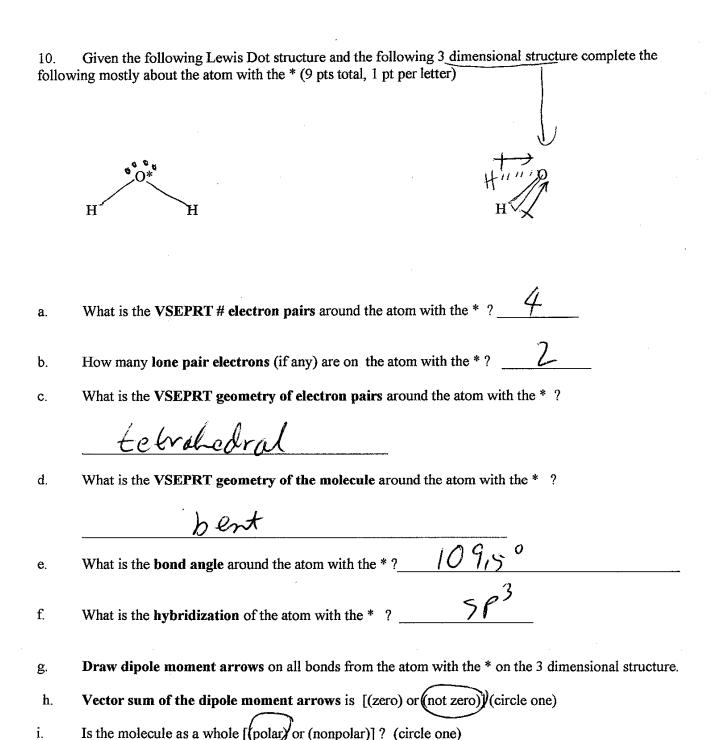
- 8(a). Is the compound Mg S [(soluble) or (insoluble)] (circle one) in water? (3 pt)
- (b) Write out the molecular form of the following precipitation reaction giving the expected products by (1) filling in the blanks and then (2) circling either (s) or (aq) by each product. The reaction does not need to be balanced. (6 pts total, 2 pt each blank, 1 pt each circling)

$$Na_2S(aq) + Mg Cl_2(aq) \rightarrow Mg S$$
 (s) or (aq)]circle one + $Na U$ [(s) or (aq)]circle

9. Complete the following acid base reaction. (6 pts total, 3 pts per blank)

$$H NO_3 (aq) + KOH (aq) \rightarrow (AQ) + (AQ$$

Dr. Hahn General Chemistry I Lecture Final Exam Spring 2014 form (8:30 A)



<u>Part III. Long Answer</u> Please <u>show work</u> for full credit and to receive partial credit. (68 pts)

**** Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.****

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work

1. This is the Dimensional Analysis problem. Problems are written to give a particular answer illustrating certain concepts in the calculation and may not be experimentally reasonable. (18 pts)

For the following reaction, if you start with 0.255 grams of H_2O (l), how many liters of product H_2 (g) will you generate at STP? (22.4 Liters = 1 mole gas at STP) (molar mass H_2O = 18.02 g/mol) [assume that the grams of H_2O (l) is the limiting reagent] (The following reaction is a balanced reaction.)

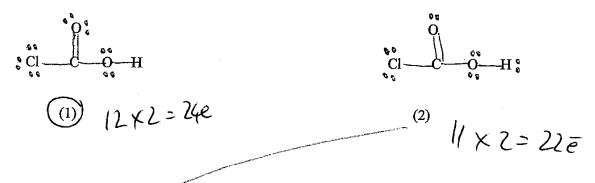
 $Sr(s) + 2 H_2O(l) \rightarrow Sr(OH)_2(aq) + H_2(g)$

0,259g x molto x 1 molto x 22,42 ltz 120 ltz0 ltz0 ltz0

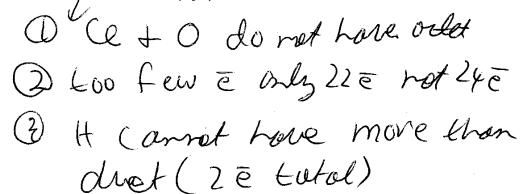
0.158 1 12

2	electron configuration, Lewis Dot, type LA problem (20	6 pts total)	
For the	e molecule ClCO ₂ H $7\bar{e}$ $Q - 6\bar{e}$	H-17	(groy#)
a.	Give the valence electron configuration for the molecule	e. (show work) (7 p	ts)
	C C	Q	14
	# Willerce = 1 = + 45	4 261.	_)

- # Valerce $\bar{e} = 7\bar{e} + 4\bar{e} + 2(\bar{6}\bar{e}) + 1\bar{e} = 0$ b. Give the Lewis Dot Symbol for the atom 0 (7 pts) $24\bar{e}$
- c. Given the following Lewis Dot Structures, choose the correct Lewis Dot structure by circling the correct number. (6 pts)



d. Explain why the Lewis Dot structure which you <u>did not choose is incorrect</u>. For full credit, you must give at least 2 reasons. (6 pts)



- 3 Other type LA problem. (24 pts total)
- a. If you have 13.2 grams of Na OH and dissolve it in distilled water to make a solution of total volume 1.25 Liters, what is the molarity of the solution? (molar mass NaOH = 40.01 grams / mole) (12 pts)

$$M = \frac{\# \text{ moles}}{\text{liter soln}}$$

$$\# \text{moles} = 13.2g \text{ NaOH} \times \frac{\text{hol NaOH}}{40.01G} = 0.330$$

$$\text{MaOH}$$

$$\text{NaOH}$$

b. How many molecules [actually the accurate term would be number of formula units (not molecules) before dissociation] of NaOH do you have in your solution? (Avogadro's number = 6.022×10^{23}) (show work) (12 pts)

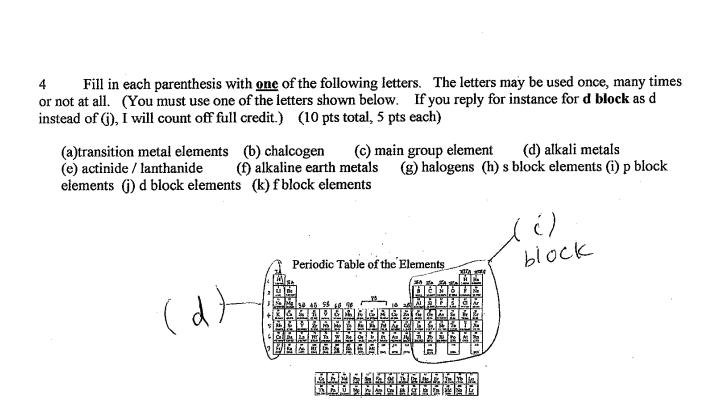
		14 4/24/14 Thursday for		
Name	ey	(print) Name		(sign)
Please show work for p Multiple choice question I obviously cannot gra and clearly tell me whe answers, I will not eve	partial credit and full cred ns have no partial credit de it. (2 pts print and sig tre the remaining answer on look at the scratch pa	dit on the Long Answers and Please write anything you run out on can be found. If you don't per. (Avogadro's number (Latm)/(mol K)] [(P2V2)	In the short Ansau want graded legibly. If f space, please continue of t tell me to look on the sc $= 6.022 \times 10^{23}$ (1 atm = 1)	swer Questions. I cannot read your work on the scratch paper page ratch paper for
If you are a graduating graduation.	senior, please circle	(graduating senior)	here so that I submit you	ır grades on time for
	HOICE. Choose the one IC. (2 pts per question,	alternative that best com	pletes the statement or an	swers the question.
1) Ag is an exa A) a comp	mple of	B) an eler	ment.	1)
	ogeneous mixture.	D) a hom	ogeneous mixture.	_
A) a comp B) a heter C) in elec (D) an elec	oound. rogeneous mixture. rtron.	broken down into simpler :	substances is	2)
3) Choose the o	orbital diagram that show	ws a violation of Hund's Ru	le.	3)
(A) [1]	11 11 1 2s 2p			·
В)	.,			
ls	1 1 1 1 2s 2p			
C)	2s 2r			
D)	1 1 1 1 1 1 1 2p			
E)	24 2p 2p			

4) The number of A) amplitu	of cycles that pass throu de	gh a stationa	ry point in a w	vave is called		4) _	
B) waveler C) area D) median	ngth	•					
E)\frequen	cy						
5) Give the nam A) sulfurou			•			5)	—
B) persulfu							
C) persulfu							
E) sulfuric	furous acid acid						
6) In which orbi	tal below would an elec	tron (on aver	age) be closes			6) <u>C</u>	
A) 2p	B) 4s	(C) 2s		D) 2p	E) 5d	6) <u> </u>	
7) Which of the	following exists as a dia	tomic molecu	ıle?			7) B	
A) phosph							
B) hydrogeC) krypton						,	
D) lithium	•						
E) carbon						_	
8) Describe the s	shape of a p orbital.					8) <u>D</u>	
A) eight ba							
B) spherica							
C) three ba							
E) four bal							
9) Give the temp	perature and pressure at	: STP (standa	rd pressure ar	nd atmosphere)).	9) <u>B</u>	
A) 0K and							
® 0°C and							
C) 32K and D) 0°C and							
•	d 1.00 in Hg						
10) 6: - 4: 6:	and a supplied for the supplied to		N 41 4		aalastiama af He	10 A	
and KOH are	onic equation for the re	eaction (if any	/) that occurs	wnen aqueous	solutions of m	<u> </u>	
	+ $OH^-(aq) \rightarrow H_2O(l)$						
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	$(3) + SO_4^{2-}(aq) \rightarrow K_2SO_4$	4(e)					
	+ OH ⁻ (aq) + 2 K+(aq) +		► H2O(l) + K2	SO4(s)			
-	q) + OH⁻(aq) → H2(OH		· 1120(1) · 102	004(0)			
	tion occurs.	/2(1)					
11) What armibal	is used to represent the	factor 1032				11) D)
A) Mega	B) micro		C) nano	i	D) kilo	<u>سا</u> (۲۰۰	
11) Mega	b) nacio		C) IIIIIO	(
Dr. Hahn	General Chemistry I L	ecture Fina	1 Spring 201	4 8:30 an	n form B	page 2	

12)	Which element can ex A) He	pand its valence : B) N	shell to accommod C) (ht electrons? DB Br	12)
13)	What is the maximum	number of p orb	itals that are possi			13)
	A) 1	B) 7	\bigcirc 3	D) 9	E) 5	
14)	Identify the compound	d with covalent b	onds.		_	14)
,	A) NaCl	B) Li	C) KBr	D) Kr	(E) CH4	-
15)	How many H+ ions ca	n the acid, H3PC)4 , donate per mol	ecule?		₁₅₎
	A) 1	B) 2	© :	3	D) 0	
16\	Choose the bond belo	w that is most no	lar			₁₆₎ A
10)	A) H-F	B) H-Br	C) C-H	D) H-Cl	E) H-I	
17\	Which of the following	a alamente is a m	otal?			17)
1/)	Which of the following A) As	B) S	C) Kr	D) Br	E Fe	11/
18)	The statement, "In a cl A) the Law of Defir		matter is neither c	reated nor destroy	yed" is called	18) <u>B</u>
19)	B) the Law of Cons C) Dalton's Atomic D) the Scientific Me E) the Law of Mult An ionic bond is best of A) the sharing of ele B) the transfer of ele C) the attraction be D) the attraction be	ervation of Mass. Theory. Theo	atom to another. oms. I atoms.			19) <u>B</u>
	E) the attraction the	at holds the atom	s together in a poly	atomic ion.		~
20)	A cation of +2 indicate A) lost two neutron B) gained two elect C) gained two prote	s. rons.	t has			20)
	D) lost two protons E) lost two electron	•				
21)	Iodine belongs to the _ A) noble gas C) alkali metal	group o	B) a	alkaline earth met halogen	al	21)
22)	Which one of the follo A) NaNO3	wing compounds B) K2CO3		ter? Ca Cl2	D Pb Cl2	22)

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (86 pts)
1 From the given list, circle all elements. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (8 pts, 2 pts each)
CH_3CH_3 O_2 Fe $NiCl_2$
2. From the list of molecules shown below circle all covalent compounds. I am asking you to circle (or to not circle) the entire compound not parts of a compound formula. (8 pts, 2 pt each)
Cl ₂) NaCl Na ₂ SO ₄ SF ₆)
For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)
Na Sodium sulfur 5

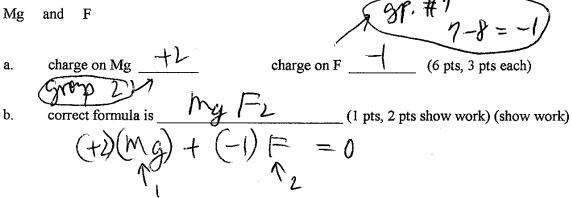


5 For the following questions, use the exact designation as shown on the periodic table which you have in front of you attached to your exam. Do not use the labels from the periodic table on the wall of the room or any other labeling other than the exact labels from the periodic table you have with your exam. Do not convert roman numbers to Arabic numbers or visa versa. (i.e. do not convert roman numeral V to Arabic number 5 or 5 to V) (12 pts total, 3 pts each)

For the element Ca

Period number is (a) 4 Group number is (b) IIAnumber protons (c) 20 number electrons (d) 20 (6040(40)

Write the correct ionic formula for the following elements. To write the correct ionic formula, you are going to do (a) & (b) below. If you show work you may earn some partial credit on part (a). You must show work for part (b) (9 pts total, 3 pts each)



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Balance the following reaction by filling in the blanks. The blanks cannot be filled with a zero. You may leave the blank empty which means the number one goes in the blank. (3 pts per blank)

$$CH_4(g) + 2 O_2(g) \rightarrow CO_2(g) + 2 H_2O(g)$$

b. Please show how many of each type of atom is in both sides of the equation after you complete balancing the reaction. (6 pts)

atoms in reactant side

atoms on product side

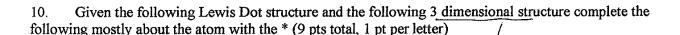
- 8(a). Is the compound Ba CO₃ I(soluble) of (insoluble)] (circle one) in water? (3 pt)
- (b) Write out the molecular form of the following precipitation reaction giving the expected products by (1) filling in the blanks and then (2) circling either (s) or (aq) by each product. The reaction does not need to be balanced. (6 pts total, 2 pt each blank, 1 pt each circling)

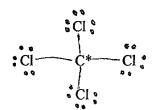
Ba
$$S(aq) + Li_2CO_3(aq) \rightarrow 100$$
 (s) or (aq)]circle one + $2i$ [(s) or (aq)]circle one

Complete the following acid base reaction. (6 pts total, 3 pts per blank) 9.

$$H Cl (aq) + Li OH (aq) \rightarrow$$
 $U (aq) + U (0q) +$

Dr. Hahn General Chemistry I Lecture Final Exam Spring 2014 form (8:30 B)





- a. What is the VSEPRT # electron pairs around the atom with the *?
- b.
- What is the **VSEPRT geometry of electron pairs** around the atom with the *? tetrabellial
- d. What is the VSEPRT geometry of the molecule around the atom with the * ? tetrahedral
- e. What is the **bond angle** around the atom with the *?_____
- What is the **bond angle** around the atom with the *? $\frac{109.50}{50}$ What is the **hybridization** of the atom with the *? $\frac{309.50}{50}$
- g. Draw dipole moment arrows on all bonds from the atom with the * on the 3 dimensional structure.
- h. Vector sum of the dipole moment arrows is [(zero) or (not zero)] (circle one)
- i. Is the molecule as a whole [(polar) or (ponpolar)]? (circle one)

<u>Part III. Long Answer</u> Please <u>show work</u> for full credit and to receive partial credit. (68 pts)

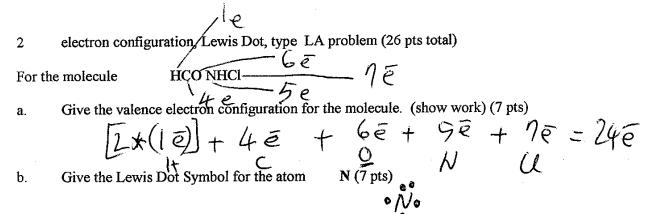
**** Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.****

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work

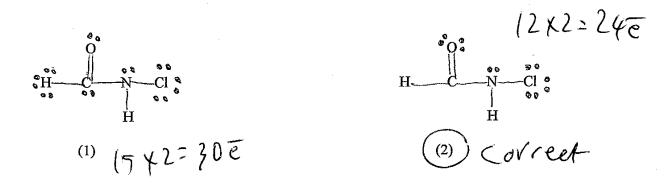
1. This is the Dimensional Analysis problem. Problems are written to give a particular answer illustrating certain concepts in the calculation and may not be experimentally reasonable. (18 pts)

For the following reaction, if you start with 1.577 grams of K(s), how many liters of product $H_2(g)$ will you generate at STP? (22.4 Liters = 1 mole gas at STP) (molar mass K = 39.10 g/mole) [assume that the grams of K(s) is the limiting reagent] (The following reaction is a balanced reaction.)

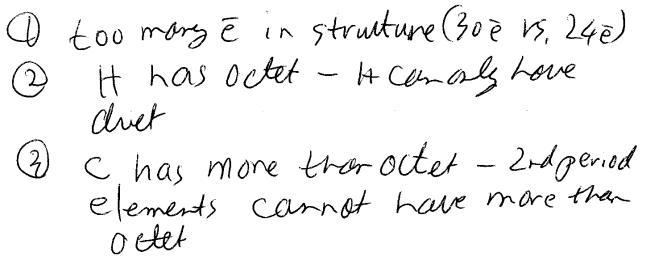
 $2 \text{ K (s)} + 2 \text{H}_2 \text{O (l)} \rightarrow 2 \text{ KOH (aq)} + \text{H}_2 \text{ (g)}$



c. Given the following Lewis Dot Structures, choose the correct Lewis Dot structure by circling the correct number. (6 pts)



d. Explain why the Lewis Dot structure which you <u>did not choose is incorrect</u>. For full credit, you must give at least 2 reasons. (6 pts)



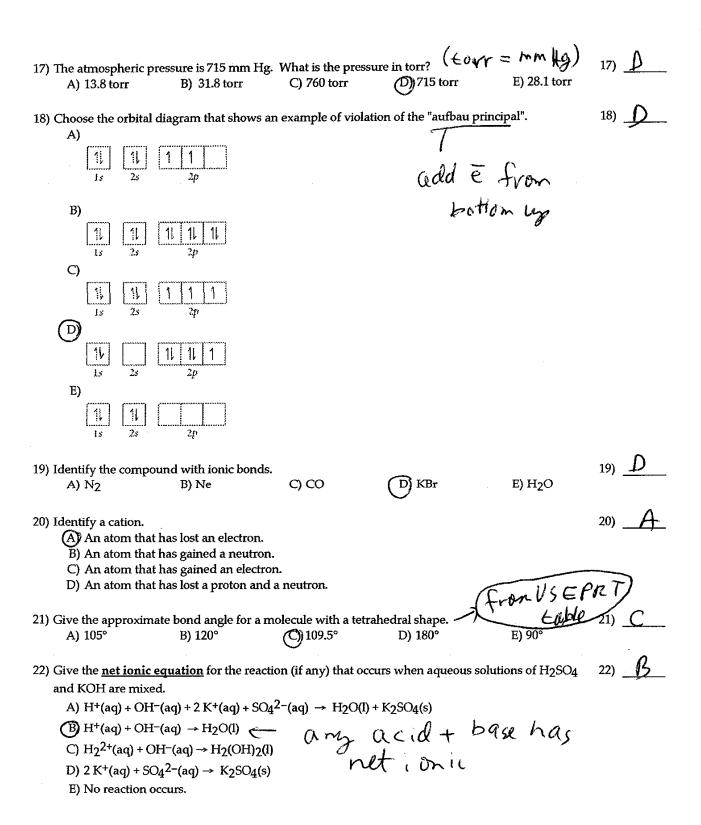
3 Other type LA problem. (24 pts total)

a. If you have 78.5 grams of Na OH and dissolve it in distilled water to make a solution of total volume 0.555 Liters, what is the molarity of the solution? (molar mass NaOH = 40.01 grams / mole) (12 pts)

b. How many molecules [actually the accurate term would be number of formula units (not molecules) before dissociation] of NaOH do you have in your solution? (Avogadro's number = 6.022×10^{23}) (show work) (12 pts)

Final	General Chemistry	I Lecture Spring 20	14 4/24/14 Thursda	ay form 9:55 A	Dr. Hann E.	Xaiii #
Name	Ker	}	(print) Name _			(sign)
Multip I obv and cl	ole choice questions h iously cannot grade i early tell me where tl	7 al credit and full cred ave no partial credit. t. (2 pts print and sig ne remaining answer	Please write anythir n exam) If you run can be found. <u>If you</u>	ng you want grad out of space , plea don't tell me to	ed legibly. If I can use continue on the look on the scratch	not read your work, scratch paper page paper for
answe (Kelvi	ers, I will not even low in = ${}^{\circ}$ C + 273.15)(P	ook at the scratch page V=nRT, R = 0.08206 (oer. (Avogadro's nui L atm)/(mol K)] [(P2	nber = 6.022×10^{-2} $(V_2) / (P_1 V_1) = T_2$	²³ (1 atm = 760 r. 2/T ₁]	nm Hg = 760 torr)
If you gradu	are a graduating sen ation.	ior, please circle (graduating senio	or) here so tha	nt I submit your gra	des on time for
		CE. Choose the one : 2 pts per question, #:		completes the st	atement or answer	s the question.
	1) Give the temper	ature and pressure at	STP (standard press	ure and atmosphe	ere).	1) <u>C</u>
	A) 32K and 1 B) 0°C and 1. C) 0°C and 1. D) 25°C and 1 E) 0K and 1.0	mm Hg 00 atm .00 in Hg				
	A) salt is disso B) water (soli C) water free D) melt solid	d) to water (liquid)		<u>c(0</u>	nsest EUF	2)
	\circ	lowing elements is a a	-		·	3) A
	(A) K	B) N	С) Ве	D) Ce	E) Br	
	4) Of the following A) Ge	elements, which has B) Si	the highest electrone C) T		(D) P	4) <u>D</u>
	5) The factor 10 ⁻³	corresponds to which	prefix?		_	5) <u>D</u>
	A) deka	B) deci	C) co	enti	D) milli	
	6) Which one of the A) ZnCO3	e following compound B) Cu3(P	and the same of th	? b(NO3)2	D) ČoS	6) <u>C</u>
	7) Give the name for A) hydrogen in B) hydrogen in C) nitrous acide D) hydrogen in E) nitric acide	nitrite nitrate d nitride				n <u>E</u>
	Dr. Hahn Gene	ral Chemistry I Lectur	re Final	Spring 2014	9:55 form A p	age 1

8) Which of the following A) K	ing elements is a no	nmetal? C) Be	D) Fe	E) Ce	8) 13
9) NO ₂ is an example of		(A)			9) _B
A) a homogeneou C) a heterogeneou			a compound. an element.		~
10) A triple covalent bor A) 0 pairs	nd contains B) 2 pairs	_ of electrons. C) 4 pairs	D) 1 pair	E 3 pairs	10)
B) a bond betwee C) a bond betwee	electrons between a en a metal and a nor en two polyatomic ic en a metal and a pol	nmetal. ons.			11)
12) The distance between A) median B) frequency C) area D) wavelength E) amplitude	en adjacent crests in	a wave is called			12) <u>D</u>
13) Which of the followi A) lithium B) krypton C) bromine D) carbon E) phosphorus	ng exists as a diator	mic molecule?			13) <u>C</u>
14) The total pressure of (otherwise in equation A) Avogadro's Law B) Charles's Law D) Ideal Gas Law E) Boyle's Law	on form: $P_T = P_a +$		l pressure of its comp	onents is known as	14) <u>C</u>
15) How many H+ ions (A) 2	can the acid, H2SO. B) 0	4 , donate per mole C) 3		D) 1	15) <u>A</u>
16) Describe the shape of A) three balls (B) spherical (C) four balls (D) dumbbell shap (E) eight balls	>0				16) <u>B</u>



<u>Part II Short Answer</u>: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (86 pts)

From the given list, circle all compounds. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (8 pts, 2 pts each)

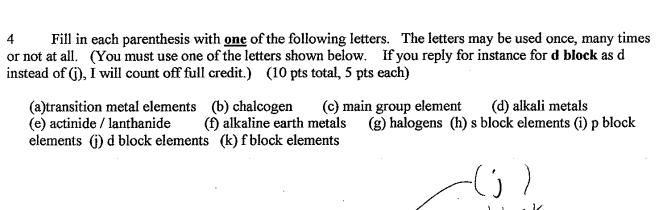
 Br_2 H_2O Zn $FeCl_2$

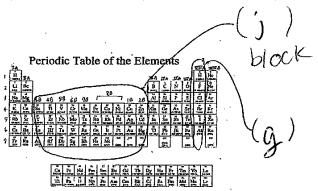
2. From the list of molecules shown below circle all ionic compounds. I am asking you to circle (or to not circle) the entire compound not parts of a compound formula. (8 pts, 2 pt each)

Li₂S NO₂ NH₄Cl O₂

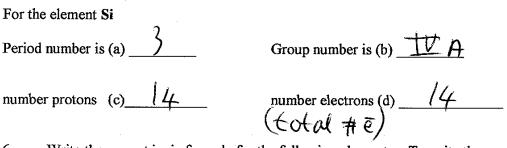
For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

I 10 dine potassium K





For the following questions, use the exact designation as shown on the periodic table which you have in front of you attached to your exam. Do not use the labels from the periodic table on the wall of the room or any other labeling other than the exact labels from the periodic table you have with your exam. Do not convert roman numbers to Arabic numbers or visa versa. (i.e. do not convert roman numeral V to Arabic number 5 or 5 to V) (12 pts total, 3 pts each)



Write the correct ionic formula for the following elements. To write the correct ionic formula, you are going to do (a) & (b) below. If you show work you may earn some partial credit on part (a). You must show work for part (b) (9 pts total, 3 pts each)

All and S

All charge on Al
$$+\frac{1}{2}$$

Charge on S

b. correct formula is 252 (1 pts, 2 pts show work) (show work) (+3)(nl) + (-1)(5) = 0

Dr. Hahn General Chemistry I Lecture Final Exam Spring 2014 form (9:55 A) page 5

7 Balance the following reaction by filling in the blanks. The blanks cannot be filled with a zero. You may leave the blank empty which means the number one goes in the blank. (3 pts per blank)

$$2 \text{ CO } (g) + O_2 (g) \rightarrow \underline{\hspace{1cm}} \text{CO}_2(g)$$

b. Please show how many of each type of atom is in both sides of the equation after you complete balancing the reaction. (6 pts)

atoms in reactant side

atoms on product side

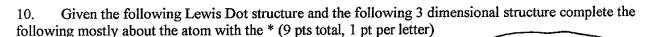
- 8. (a). Is the compound Al PO₄ [(soluble) or (insoluble)] (circle one) in water? (3 pt)
- (b) Write out the molecular form of the following precipitation reaction giving the expected products by (1) filling in the blanks and then (2) circling either (s) or (aq) by each product. The reaction does not need to be balanced. (6 pts total, 2 pt each blank, 1 pt each circling)

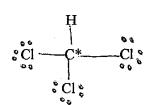
$$AlCl_3(aq) + Na_3 PO_4(aq) \rightarrow IlCl_3(aq) + Na_3 PO_4(aq) + Na_3 PO_4(aq)$$

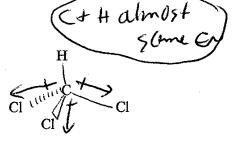
9. Complete the following acid base reaction. (6 pts total, 3 pts per blank)

$$HF(aq) + NaOH(aq) \rightarrow NaF(aq) + HOO(1)$$

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- a. What is the **VSEPRT** # electron pairs around the atom with the *?
- b. How many lone pair electrons (if any) are on the atom with the *? 2 ero
- c. What is the **VSEPRT geometry of electron pairs** around the atom with the *?



d. What is the **VSEPRT geometry of the molecule** around the atom with the * ?



- e. What is the **bond angle** around the atom with the *? (09.5°)
- f. What is the **hybridization** of the atom with the *?
- g. Draw dipole moment arrows on all bonds from the atom with the * on the 3 dimensional structure.
- h. Vector sum of the dipole moment arrows is [(zero) o (not zero)] (circle one)
- i. Is the molecule as a whole ((polar) or (nonpolar)]? (circle one)

<u>Part III. Long Answer</u> Please <u>show work</u> for full credit and to receive partial credit. (68 pts)

**** Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.****

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work

1. This is the Dimensional Analysis problem. Problems are written to give a particular answer illustrating certain concepts in the calculation and may not be experimentally reasonable. (18 pts)

For the following reaction if you start with 25.7 mL of a 0.15 M solution of the H Cl (aq), what is the theoretical yield of the CaCl₂ in grams (assuming that you are able to get out the solid CaCl₂ after the end of the reaction by evaporation)? (molar mass CaCl₂ = 111.08 grams / mole) (show work)

 $2 \text{ HCl (aq)} + \text{Ca (OH)}_2 \text{ (aq)} \rightarrow \text{CaCl}_2 \text{ (aq)} + 2 \text{ H}_2 \text{O (l)}$

25,7 ml x 0.15 moltill x Ind(allz x 111,089) HCl 1000ml 2 mol Ind 501n. 501n. HCl Lath

0,214g Calle

2	electron configuration,	Lewis Dot. type	LA problem	(26 pts total)
	Older on Commandiation,	, v , v , v , p +	Proorer ((P ++ +++++-

For the element Sb , (show work if appropriate) (26 pts)

- a. What is the atomic mass? 121,760 (3 pts)
- b. What is the atomic number? _____(3 pts)
- c. How many valence electrons? (explain or show work) (3 pts)
- d. Give the electron configuration in the format (1s², 2s², format only gives format & has no information about what the answer looks like.) (6 pts)

e. Give the valence electron configuration in the format (1s², 2s², format only gives format & has no information about what the answer looks like.) (6 pts)

f. Give the valence electron configuration diagram in the format $(\frac{1}{ls}, \frac{1}{ls}, \frac{1}{2s}, \frac{1}{2p}, \frac{1}{2p})$ (format only gives format and has no information about the answer)

3 Other type LA problem. (24 pts total)

If you do a reaction which produces 25.2 Liters of a gas CH₄ and collect it in a gas cylinder at 1.022 atmosphere, 299.2 Kelvin.

a. How many molecules of CH₄ do you have in that volume of gas approximately? (22.4 Liters = 1 mole of gas) (You may assume that the molar volume at STP is close enough at this nonstandard condition to get a good approximate number for this question.) (Avogadro's number = 6.022×10^{23}) (show work) (12 pts)

b. If you close the gas cylinder opening and then check the condition of the gas cylinder contents you find that the pressure is 1.52 atmosphere, temperature is 304.2 Kelvin. What is the new volume? $[(P_2V_2)/(P_1V_1) = T_2/T_1]$ (show work) (12 pts)

$$P_{1} = 1.022atm \qquad P_{2} = 1.52atm$$

$$V_{1} = 25.2 l \qquad V_{2} = ?$$

$$T_{1} = 299.2 k \qquad T_{2} = 304.2 k$$

$$\frac{(1.52atm)(V_{2})}{(1.022atm)(25.2 l)} = \frac{304.2 k}{299.2 k}$$

$$V_{2} = \frac{?04.2 k}{299.2 k} \left(\frac{1.022atm}{1.52atm}\right) (25.2 l) = 17.2 l$$

Final	General Chemistry	I Lecture Spring 2014	4/24/14 Thursd	lay form 9:55 B	Or. Hahn Exa	m #
Name	Ker	γ	(print) Name_			(sign)
Multip I obv and cl	ole choice questions h iously cannot grade it early tell me where th	al credit and full credit ave no partial credit. t. (2 pts print and sign ne remaining answer ca	on the Long Answ Please write anythi exam) If you run in be found. <u>If yo</u> u	ers and in some of thing you want graded out of space, please adon't tell me to loc	ne Short Answer (legibly. If I cann continue on the s ok on the scratch p	ot read your work cratch paper page paper for
(Kelv	$\sin = {}^{O}C + 273.15)(P)$	V=nRT, R=0.08206 (L	atm)/(mol K)] [(P	$_{2}V_{2}) / (P_{1} V_{1}) = T_{2}/T$	1}	
If you gradu	are a graduating seni ation.	or, please circle (g1	raduating seni	or) here so that I	submit your grad	es on time for
		CE. Choose the one al 2 pts per question, ## ₁		t completes the state	ment or answers	the question.
	1) Give the name for A) hydrogen n B) hydrogen n C) hydrogen n D) nitrous acid	nitride nitrate nitrite				1)
	2) Identify the comp A) H ₂ O	oound with ionic bonds (B) KBr	s. C) Ne	D) N ₂	E) CO	2) <u>B</u>
	3) A triple covalent A) 2 pairs	bond contains B) 0 pairs	of electrons. C) 4 pairs	D 3 pairs	E) 1 pair	3)
	B) An atom th (C) An atom th	at has gained an electro at has gained a neutror at has lost an electron. at has lost a proton and	1.		·	4)
	5) The factor 10 ⁻³ co	orresponds to which pr B) deci	refix?	enti	D) deka	5) 2
	6) Which of the followard A) phosphorus B) carbon bromine D) krypton E) lithium	owing exists as a diaton	nic molecule?			6)
	7) How many H+ io	ns can the acid, H2SO4 B) 0	, donate per mole C) 3		D) 1	7) _A
	Dr. Hahn Gener	al Chemistry I Lecture	Final	Spring 2014 9	:55 form B pag	e 1

page

8) Choose the orbital diagram that shows an example of violation of the "aufbau principal". A)	8)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
B) $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
C) \[\begin{align*} \frac{4}{1} & \frac{1}{1} & \frac{1}	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
E) 1s 2s 2p	
9) Give the temperature and pressure at STP (standard pressure and atmosphere). (A) 0°C and 1.00 atm B) 25°C and 1.00 in Hg C) 0°C and 1 mm Hg D) 0K and 1.00 atm E) 32K and 1 torr Hg	9) <u>A</u>
 10) A covalent bond is best described as A) a bond between a metal and a nonmetal. B) a bond between two polyatomic ions. C) a bond between a metal and a polyatomic ion. D) the transfer of electrons. E) the sharing of electrons between atoms. 	10)
11) The total pressure of a gas mixture is the sum of the partial pressure of its components is known as (otherwise in equation form: $P_T = P_a + P_b + P_c$) A) Boyle's Law B) Charles's Law C) Avogadro's Law D) Ideal Gas Law E) Dalton's Law	11)
12) NO ₂ is an example of A) an element. B) a heterogeneous mixture.	12) <u>C</u>
D) a homogeneous mixture. 13) Give the approximate bond angle for a molecule with a tetrahedral shape. (A) 109.5° (B) 105° (C) 180° (D) 90° (E) 120°	13) <u>A</u>
Dr. Hahn General Chemistry I Lecture Final Spring 2014 9:55 form B page 2	

	elements, which has		•	12) m	14) <u>B</u>
A) Ge	BJP	C) S	21	D) Ti	
15) The distance bet (A) wavelengtl B) area C) median D) amplitude E) frequency	ween adjacent crests in	in a wave is called	•		15)
16) Which of the foll	owing elements is a r	onmetal?			16) B
A) K	BN	C) Be	D) Ce	E) Fe	10) <u> </u>
A) salt is disso B) melt solid g C) water freez D) water (solid	gold to liquid gold				17)
and KOH are min A) 2 K ⁺ (aq) + 9 B) H ⁺ (aq) + 0 C) H2 ²⁺ (aq) +	$5O_4^2$ -(aq) $\rightarrow K_2SO_4$ H-(aq) \rightarrow H ₂ O(l) OH-(aq) \rightarrow H ₂ (OH); H-(aq) + 2 K+(aq) + S	(s) 2(l)	-	solutions of H ₂ SO ₄	18) (2
19) Describe the shap A) eight balls B) four balls C) three balls D) spherical E) dumbbell sl					19)
20) The atmospheric A) 760 torr	pressure is 715 mm H B) 31.8 torr			FN 715 1	20)
A) 700 l011	b) 31.0 torr	C) 28.1 torr	D) 13.8 torr	(E) 715 torr	_
21) Which of the follo A) Ce	owing elements is a al	kali metal? C) Be	D) N	E) Br	20) <u>E</u> 21) <u>B</u> 22) <u>B</u>
22) Which one of the A) CoS	following compound		ua(PO4)a	D) ZnCO3	22)

<u>Part II</u> Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (86 pts)

From the given list, circle all elements. You may want to look at the periodic table if you are unfamiliar with the symbols for the elements. (8 pts, 2 pts each)

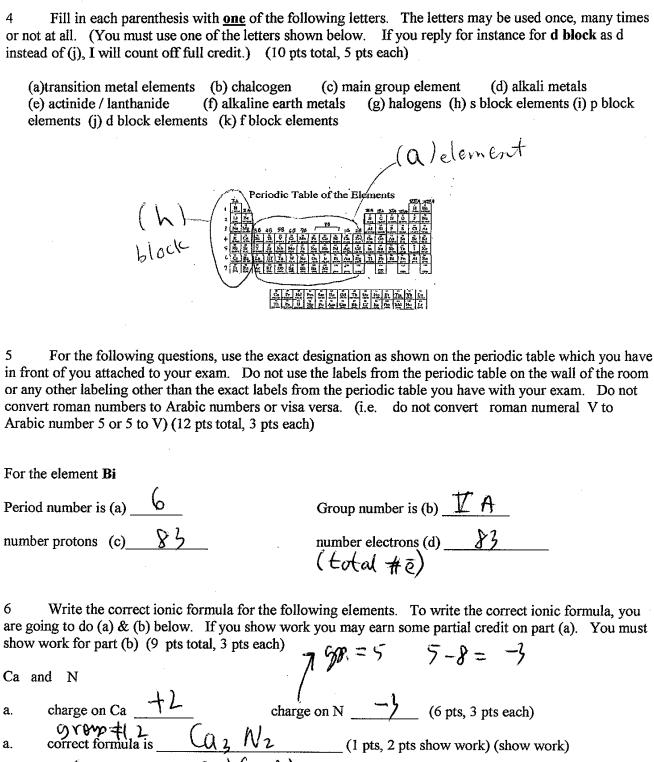
$\left(Br_{2}\right)$	H_2O	(Zn)	FeCl

2. From the list of molecules shown below circle all covalent compounds. I am asking you to circle (or to not circle) the entire compound not parts of a compound formula. (8 pts, 2 pt each)

 Li_2S NO_2 NH_4CI O_2

For the following either fill in the blank with the element symbol or the word for the element name. (I do not count off for small spelling errors in naming elements.) (6 pts, 3 pts each)

N Nitrager copper ____



(Ca)(+2) + (N)(-1) = 0 (3)(+2) + (2)(-1) = 0

a. Balance the following reaction by filling in the blanks. The blanks cannot be filled with a zero. You may leave the blank empty which means the number one goes in the blank. (3 pts per blank)

$$2 SO_2(g) + O_2(g) \rightarrow SO_3(g)$$

b. Please show how many of each type of atom is in both sides of the equation after you complete balancing the reaction. (6 pts)

atoms in reactant side

atoms on product side

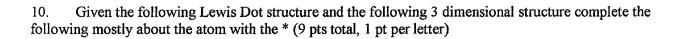
- 8(a). Is the compound Mg (OH)₂ [(soluble) or (insoluble)] (circle one) in water? (3 pt)
- (b) Write out the molecular form of the following precipitation reaction giving the expected products by (1) filling in the blanks and then (2) circling either (s) or (aq) by each product. The reaction does not need to be balanced. (6 pts total, 2 pt each blank, 1 pt each circling)

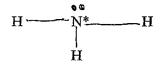
$$Mg(NO_3)_2(aq) + Ca(OH)_2(aq) \rightarrow Mg(NO_3)_2(s)or(aq)]$$
 circle one + $Ca(NO_3)_2(s)or(aq)$ circle

9. Complete the following acid base reaction. (6 pts total, 3 pts per blank)

$$HI(aq) + LiOH(aq) \rightarrow Li J (aq) + HO (1)$$

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- a. What is the VSEPRT # electron pairs around the atom with the *? ______
- b. How many lone pair electrons (if any) are on the atom with the *?
- c. What is the VSEPRT geometry of electron pairs around the atom with the *?

 Letvah e dral
- d. What is the **VSEPRT geometry of the molecule** around the atom with the *?



- e. What is the **bond angle** around the atom with the *? 109,50
- f. What is the hybridization of the atom with the *? _______
- g. Draw dipole moment arrows on all bonds from the atom with the * on the 3 dimensional structure.
- h. Vector sum of the dipole moment arrows is [(zero) or (not zero)] (circle one)
- i. Is the molecule as a whole [(polar)) or (nonpolar)]? (circle one)

<u>Part III. Long Answer</u> Please <u>show work</u> for full credit and to receive partial credit. (68 pts)

**** Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.****

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work

1. This is the Dimensional Analysis problem. Problems are written to give a particular answer illustrating certain concepts in the calculation and may not be experimentally reasonable. (18 pts)

For the following reaction if you start with 35.8 mL of a 0.20 M solution of the H Cl (aq), what is the theoretical yield of the CaCl₂ in grams (assuming that you are able to get out the solid CaCl₂ after the end of the reaction by evaporation)? (molar mass CaCl₂ = 111.08 grams / mole) (show work)

 $2 \text{ HCl (aq)} + \text{Ca (OH)}_2 \text{ (aq)} \rightarrow \text{CaCl}_2 \text{ (aq)} + 2 \text{ H}_2 \text{O (l)}$

0.398 g Calle

2 electron configuration, Lewis Dot, type LA problem (26 pts total)

For the element Ga, (show work if appropriate) (26 pts)

- a. What is the atomic mass? (3 pts)
- b. What is the atomic number? (3 pts)
- c. How many valence electrons? (explain or show work) (3 pts)
- d. Give the electron configuration in the format (1s², 2s², format only gives format & has no information about what the answer looks like.) (6 pts)

e. Give the valence electron configuration in the format (1s², 2s², format only gives format & has no information about what the answer looks like.) (6 pts)

f. Give the valence electron configuration diagram in the format $(\frac{1}{\sqrt{1}} \frac{1}{\sqrt{1}} \frac{1}{\sqrt{2}} \frac{1}{\sqrt{2}$

3 Other type LA problem. (24 pts total)

If you do a reaction which produces 1.77 Liters of a gas CH₄ and collect it in a gas cylinder at 0.982 atmosphere, 278.2 Kelvin.

a. How many molecules of CH₄ do you have in that volume of gas approximately? (22.4 Liters = 1 mole of gas) (You may assume that the molar volume at STP is close enough at this nonstandard condition to get a good approximate number for this question.) (Avogadro's number = 6.022×10^{23}) (show work) (12 pts)

b. If you close the gas cylinder opening and then check the condition of the gas cylinder contents you find that the pressure is 2.75 atmosphere, temperature is 270.2 Kelvin. What is the new volume? $[(P_2V_2)/(P_1V_1) = T_2/T_1]$ (show work) (12 pts)

$$\begin{array}{lll}
\theta_{1} &= 0.982 \, \text{atm} & \theta_{2} &= 2.15 \, \text{atm} \\
V_{1} &= 1.11 \, l & V_{2} &= ? \\
T_{1} &= 2.78.2 \, K & T_{2} &= 2.70.2 \, K \\
& \frac{(2.75 \, \text{atm})(V_{2})}{(0.981 \, \text{atm})(1.11 \, l)} &= \frac{2.70.2 \, K}{2.78.2 \, K} \\
& \frac{V_{2} &= \left(\frac{2.70.2 \, K}{2.75 \, \text{atm}}\right)\left(1.11 \, l\right) = 0.614}{2.78.2 \, K}
\end{array}$$

Dr. Hahn General Chemistry I Lecture Final Exam Spring 2014 form (9:55 B)

Final General Chemi	stry I Lecture Spring 2014	4/24/14 Thursda	y form 8:30 am A	Dr. Hahn Exam	#
Name		(print) Name_			(sign)
Multiple choice question I obviously cannot grand clearly tell me who answers, I will not ev	partial credit and full credit ons have no partial credit. ade it. (2 pts print and sign ere the remaining answer c en look at the scratch pape (5)(PV=nRT, R = 0.08206 (1	Please write anythi exam) If you run an be found. <u>If you</u> <u>r.</u> (Avogadro's nu	ng you want graded l out of space , please on the space of the space o	legibly. If I canno continue on the so k on the scratch p (1 atm = 760 mn	it read your work, cratch paper page <u>aper for</u>
If you are a graduating graduation.	g senior, please circle (g	raduating seni	or) here so that I	submit your grade	es on time for
	HOICE. Choose the one a MC. (2 pts per question, ##		completes the state	ment or answers t	he question.
1) How many	H+ ions can the acid, H3PC	M. donate per mol	ecule?		1)
A) 1	B) 3	C) (D) 2	,
A) gained B) gained C) lost tw D) lost tw	+2 indicates that an elemen I two protons. I two electrons. vo electrons. vo protons. vo neutrons.	t has			2)
·	bond below that is <u>most</u> po	lar			3)
A) H-Br	B) H-Cl	C) H-I	D) C-H	E) H-F	·
A) a hete B) an ele	ogeneous mixture. ctron.	oken down into sin	npler substances is		4)
5) Identify the	compound with covalent b	onds.			5)
A) Li	B) KBr	C) Kr	D) CH4	E) NaCl	
6) In which or A) 4s	bital below would an electr B) 5d	on (on average) be C) 2p	closest to the nucleus D) 2p	? E) 2s	6)
A) alkali	ngs to the group o metal ne earth metal	В) 1	nalogen noble gas	·	7)

1

8) Ag is an example of				8)
A) a compound.		B) a homogeneous mix	ture.	
C) an element.		D) a heterogeneous mix	cture.	
9) Give the name for H ₂ SO ₄ .				9)
A) hyposulfurous acid				
B) persulfuric acid				
C) sulfuric acid				
D) persulfurous acid				
E) sulfurous acid				
10) Which of the following exis	ta ac a diatamia malac	11o2		10)
A) lithium	is as a diatomic molec	uic:		10)
B) hydrogen				
C) krypton				
D) phosphorus				
E) carbon			,	
,				
11) Give the net ionic equation	for the reaction (if an	y) that occurs when aqueous	s solutions of H2SO4	11)
and KOH are mixed.				
A) $H^+(aq) + OH^-(aq) \rightarrow$	H ₂ O(l)			
B) H ₂ ²⁺ (aq) + OH ⁻ (aq) -				
C) H+(aq) + OH-(aq) + 2	$K^+(aq) + SO_4^2-(aq)$	→ H ₂ O(l) + K ₂ SO ₄ (s)		
D) $2 K^{+}(aq) + SO_4^{2}-(aq)$	→ K2SO4(s)			
E) No reaction occurs.	2			
2) 110 10401011 0404101				
12) Which one of the following	compounds is insolub	le in water?		12)
A) K2CO3	B) NaNO3	C) Pb Cl2	D) Ca Cl2	
13) Describe the shape of a p or	bital.			13)
A) four balls				<u> </u>
B) spherical				
C) three balls				
D) dumbbell shaped				
E) eight balls				
•				
14) Which element can expand	its valence shell to acc	commodate more than eight	electrons?	14)
A) Br	B) N	C) He	D) O	
15) An ionic bond is best descri	bed as			15)
A) the attraction between				
B) the attraction that hole		in a polyatomic ion.		
C) the attraction between				
D) the sharing of electron		17 · ·		
E) the transfer of electron	is from one atom to at	nomer.		

6) What is the max	imum number of p orbi	itals that are poss	ible (number of m	l values for $l = 1$?	16)
A) 3	B) 9	C) 1	D) 7	E) 5	
17) The number of c A) area B) amplitude C) wavelengt D) median E) frequency	rycles that pass through	a stationary poin	t in a wave is calle	d	17)
A) the Scienti B) the Law of C) the Law of D) the Law of	In a chemical reaction, fic Method. Definite Proportions. Conservation of Mass. Multiple Proportions. tomic Theory.		created nor destroy	ved" is called	18)
	used to represent the fa		1.9-	D) namo	19)
A) micro	B) Mega		kilo	D) nano	20)
20) Which of the fol A) Fe	lowing elements is a me B) Br	etal? C)S	D) Kr	E) As	20)
21) Choose the orbit A)	at hamming the second	a violation of Hu	nd's Rule.		21)
1s 2s B) (1) (1) 1s 2s	2p				
C) [1] [1] [2]	at immulamentaris.				
D) [1] [4] [4] [5] [5]					
E) [1] [1]	111				

22) Give the temperature and pressure at STP (standard pressure and atmosphere).

22) ____

- A) 0K and 1.00 atm
- B) 0°C and 1.00 atm
- C) 32K and 1 torr Hg
- D) 0°C and 1 mm Hg
- E) 25°C and 1.00 in Hg

<u>Part II Short Answer</u>: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (86 pts)

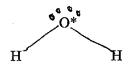
	From the given lis				t the period	ic table if yo	u are
СН₃СН	O_2	Fe	NiCl ₂				
	From the list of mot circle) the enti						rcle (or to
Cl_2	NaCl	Na ₂ SO ₄	SI	⁷ 6			
	For the following do not count off for						nt name. (
Fe			oxygen _				

Fill in each parenthesis with or not at all. (You must use one of instead of (j), I will count off full creations.)	the letters shown below. It	The letters may be used once, many times f you reply for instance for d block as d ch)
(a)transition metal elements (b) (e) actinide / lanthanide (f) elements (j) d block elements	alkaline earth metals (g)	oup element (d) alkali metals halogens (h) s block elements (i) p block
•	7	
	Periodic Table of the Hard St. 18 18 18 18 18 18 18 18 18 18 18 18 18	25.4 31.5 35.5 31.6 14.1 14.1 14.1 14.1 14.1 14.1 14.1 1
()		TO DO HAS SE TON TO LED THE CONTROL OF THE PARTY OF THE
5 For the following questions, in front of you attached to your examor any other labeling other than the	use the exact designation as m. Do not use the labels fro exact labels from the periodi umbers or visa versa. (i.e.	shown on the periodic table which you hav m the periodic table on the wall of the room c table you have with your exam. Do not do not convert roman numeral V to
For the element N		
Group number is (a)	Period num	ber is (b)
number protons (c)	number elec	etrons (d)
	you show work you may ear	s. To write the correct ionic formula, you n some partial credit on part (a). You must
K and Se		
a. charge on K	charge on Se	(6 pts, 3 pts each)
b. correct formula is	(1 pts,	2 pts show work) (show work)

7 a. Balance the following reaction You may leave the blank empty which means	n by filling in the blanks. The blanks cannot ans the number one goes in the blank. (3 pts	t be filled with a zero. s per blank)
$2 H_2S(g) + 3 O_2(g) \RightarrowSO_2(g)$	+ 2 H ₂ O (g)	
b. Please show how many of each type balancing the reaction. (6 pts)	e of atom is in both sides of the equation after	er you complete
atoms in reactant side	atoms on product side	
8(a). Is the compound Mg S [(soluble) (b) Write out the molecular form of the foll filling in the blanks and then (2) circling need to be balanced. (6 pts total, 2 pt each	owing precipitation reaction giving the expegeither (s) or (aq) by each product. The	cted products by (1) reaction does not
$Na_2S(aq) + Mg Cl_2(aq) \rightarrow$ one	[(s) or (aq)]circle one +	[(s) or (aq)]circle
9. Complete the following acid base re	eaction. (6 pts total, 3 pts per blank)	
H NO ₃ (aq) + KOH (aq) →	(aq) +	(1)

Dr. Hahn General Chemistry I Lecture Final Exam Spring 2014 form (8:30 A)

Given the following Lewis Dot structure and the following 3 dimensional structure complete the 10. following mostly about the atom with the * (9 pts total, 1 pt per letter)





- What is the **VSEPRT** # electron pairs around the atom with the *? a.
- How many lone pair electrons (if any) are on the atom with the *? b.
- What is the VSEPRT geometry of electron pairs around the atom with the * ? C.
- What is the VSEPRT geometry of the molecule around the atom with the * ? d.
- What is the **bond angle** around the atom with the *? e.
- What is the hybridization of the atom with the * ? f.
- Draw dipole moment arrows on all bonds from the atom with the * on the 3 dimensional structure. g.
- Vector sum of the dipole moment arrows is [(zero) or (not zero)] (circle one) h.
- i. Is the molecule as a whole [(polar) or (nonpolar)]? (circle one)

<u>Part III.</u> <u>Long Answer</u> Please <u>show work</u> for full credit and to receive partial credit. (68 pts)

**** Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.****

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work

1. This is the Dimensional Analysis problem. Problems are written to give a particular answer illustrating certain concepts in the calculation and may not be experimentally reasonable. (18 pts)

For the following reaction, if you start with 0.255 grams of H_2O (l), how many liters of product H_2 (g) will you generate at STP? (22.4 Liters = 1 mole gas at STP) (molar mass H_2O = 18.02 g/mol) [assume that the grams of H_2O (l) is the limiting reagent] (The following reaction is a balanced reaction.)

 $Sr(s) + 2 H_2O(1) \rightarrow Sr(OH)_2(aq) + H_2(g)$

2 electron configuration, Lewis Dot, type LA problem (26 pts total)

For the molecule ClCO₂H

- a. Give the valence electron configuration for the molecule. (show work) (7 pts)
- b. Give the Lewis Dot Symbol for the atom **O** (7 pts)
- c. Given the following Lewis Dot Structures, choose the correct Lewis Dot structure by circling the correct number. (6 pts)

d. Explain why the Lewis Dot structure which you <u>did not choose is incorrect</u>. For full credit, you must give at least 2 reasons. (6 pts)

- 3 Other type LA problem. (24 pts total)
- a. If you have 13.2 grams of Na OH and dissolve it in distilled water to make a solution of total volume 1.25 Liters, what is the molarity of the solution? (molar mass NaOH = 40.01 grams / mole) (12 pts)

b. How many molecules [actually the accurate term would be number of formula units (not molecules) before dissociation] of NaOH do you have in your solution? (Avogadro's number = 6.022×10^{23}) (show work) (12 pts)

Final General Chemistry I Lecture Spring 20	014 4/24/14 Thursday form 8:30 am B Dr. Hahn	Exam #
Name	(print) Name	(sign)
Multiple choice questions have no partial cred I obviously cannot grade it. (2 pts print and s and clearly tell me where the remaining answ	redit on the Long Answers and in some of the Short Anslit. Please write anything you want graded legibly. If sign exam) If you run out of space, please continue over can be found. If you don't tell me to look on the sepaper. (Avogadro's number = 6.022×10^{23} (1 atm = $\frac{1000}{1000}$) (100 K)] [$\frac{1000}{1000}$] [$\frac{1000}{1000}$] [$\frac{1000}{1000}$]	I cannot read your work, on the scratch paper page ratch paper for
If you are a graduating senior, please circle graduation.	(graduating senior) here so that I submit you	ur grades on time for
Part I MULTIPLE CHOICE. Choose the or No partial credit for MC. (2 pts per question	ne alternative that best completes the statement or an n, ## pts total)	swers the question.
 Ag is an example of A) a compound. C) a heterogeneous mixture. 	B) an element. D) a homogeneous mixture.	1)
 2) A substance that can't be chemicall A) a compound. B) a heterogeneous mixture. C) an electron. D) an element. E) a homogeneous mixture. 	ly broken down into simpler substances is	2)
3) Choose the orbital diagram that sho A) \[\frac{4!}{1!} \ \frac{4!}{1!} \ \ \frac{1!}{2s} \ \ \frac{2p}{2p} \]	ows a violation of Hund's Rule.	3)
B)		
C) 11, 11, 1 1 1 1s 2s 2p		
D) $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		
1s 2s 2p		

Final

4) The number of A) amplitude B) wavelend C) area D) median E) frequend	gth	igh a stationary	point in a wave	e is called		4)
5) Give the name A) sulfurou B) persulfu C) persulfu D) hyposul E) sulfuric	s acid ric acid rous acid furous acid					5)
6) In which orbit	al below would an ele	ctron (on averaș				6)
A) 2p	B) 4s	C) 2s	D)	2p	E) 5d	
7) Which of the A) phospho B) hydroge C) krypton D) lithium E) carbon	n	atomic molecule	e?			7)
8) Describe the s A) eight ba B) spherica C) three ba D) dumbbe E) four bal	l lls Il shaped					8)
A) 0K and B) 0°C and C) 32K and D) 0°C and	1.00 atm l 1 torr Hg	nt STP (standard	d pressure and a	atmosphere).		9)
and KOH are A) H ⁺ (aq) B) 2 K ⁺ (aq C) H ⁺ (aq)	onic equation for the paixed. $+ OH^-(aq) \rightarrow H_2O(l)$ $+ SO_4^2-(aq) \rightarrow K_2SO_4$ $+ OH^-(aq) + 2 K^+(aq) + OH^-(aq) \rightarrow H_2(OP)$	04(s) · SO4 ²⁻ (aq) →			ations of H ₂ SO ₄	10)
E) No reac	tion occurs.					
11) What symbol A) Mega	is used to represent th B) micr		C) nano	D)	kilo	11)
Dr Hahn	General Chemistry I	Lecture Final	Spring 2014	8:30 am fo	rm B page	2

12) Which eleme	ent can expand its valence s	n expand its valence shell to accommodate more than eight electrons?			12)
A) He	B) N	C) (0	D) Br	
13) What is the	naximum number of p orb	itals that are possi	ble (number of m $_{\ell}$	values for t = 1)?	13)
A) 1	B) 7	C) 3	D) 9	E) 5	
		_			14)
	compound with covalent be		D) K-	17) CL	14)
A) NaCl	B) Li	C) KBr	D) Kr	E) CH4	-
15) How many	H+ ions can the acid, H3PO	4. donate per mo	lecule?		15)
A) 1	B) 2	C) :		D) 0	, <u></u>
71,1	2) 2	9,	-	., -	
16) Choose the l	ond below that is <u>most</u> pol	ar.			16)
A) H-F	B) H-Br	C) C-H	D) H-Cl	E) H-I	
•	e following elements is a me		D) B	E/ E	17)
A) As	B) S	C) Kr	D) Br	E) Fe	
10) 77			manta d man daatmarra	d" is called	18)
	nt, "In a chemical reaction, in which the of Definite Proportions.	matter is neither c	reated nor destroye	u is called	10)
	w of Conservation of Mass.				
•	's Atomic Theory.				
	entific Method.				
•	w of Multiple Proportions.				
	d is best described as				19)
	ring of electrons.				
•	nsfer of electrons from one				
•	raction between 2 metal ato				
•	raction between 2 nonmetal				
E) the att	raction that holds the atoms	together in a pory	atomic ion.		
20) A cation of 4	2 indicates that an element	has			20)
•	o neutrons.	IIIIO			20)
·	two electrons.				
. •	two protons.				
D) lost tw					
E) lost tw	o electrons.				
	gs to the group of	-			21)
A) noble ş C) alkalı r			alkaline earth metal		
C) aikaii i	lictai	ו (ט	halogen		
	f the following compounds				22)
A) NaNO	B) K2CO3	C) (Ca Cl2	D) Pb Cl2	

<u>Part II Short Answer</u>: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work. (86 pts)

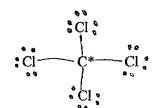
			nents. You may wa ents. (8 pts, 2 pts ea		periodic table if yo	ou are
CH₃CH₃	O_2	Fe	NiCl ₂			
			below circle all cov ts of a compound fo			ı to circle (or
Cl ₂	NaCl	Na ₂ SO ₄	SF_6			
3 For do not coun	the following nt off for small	either fill in the I spelling errors	blank with the elen in naming elements	nent symbol or the	e word for the eler ch)	nent name. (I
Na			sulfur			

4 Fill in each parenthesis with or not at all. (You must use one of instead of (j), I will count off full counts.)	one of the following letters. The letters may be used once, many the letters shown below. If you reply for instance for d block as edit.) (10 pts total, 5 pts each)	times d
(a)transition metal elements (e) actinide / lanthanide (f) elements (j) d block elements	b) chalcogen (c) main group element (d) alkali metals alkaline earth metals (g) halogens (h) s block elements (i) p b (k) f block elements	lock
	Periodic Table of the Elements A	
in front of you attached to your exa or any other labeling other than the	use the exact designation as shown on the periodic table which you. Do not use the labels from the periodic table on the wall of the exact labels from the periodic table you have with your exam. Do umbers or visa versa. (i.e. do not convert roman numeral V to total, 3 pts each)	e room o not
For the element Ca		
Period number is (a)	Group number is (b)	
number protons (c)	number electrons (d)	
are going to do (a) & (b) bel	ula for the following elements. To write the correct ionic formula ow. If you show work you may earn some partial credit on part (rt (b) (9 pts total, 3 pts each)	
Mg and F		
a. charge on Mg	charge on F (6 pts, 3 pts each)	
b. correct formula is	(1 pts, 2 pts show work) (show work)	

7 a. Balance the following reaction by filling in the blanks. The blanks cannot be filled with a zero. You may leave the blank empty which means the number one goes in the blank. (3 pts per blank)
$CH_4(g) + 2 O_2(g) \rightarrow \underline{\qquad} CO_2(g) + 2 H_2O(g)$
b. Please show how many of each type of atom is in both sides of the equation after you complete balancing the reaction. (6 pts)
atoms in reactant side atoms on product side
8(a). Is the compound Ba CO ₃ [(soluble) or (insoluble)] (circle one) in water? (3 pt)
(b) Write out the molecular form of the following precipitation reaction giving the expected products by (1) filling in the blanks and then (2) circling either (s) or (aq) by each product. The reaction does not need to be balanced. (6 pts total, 2 pt each blank, 1 pt each circling)
Ba $S(aq) + Li_2CO_3(aq) \rightarrow$ [(s) or (aq)]circle one +[(s) or (aq)]circle one
9. Complete the following acid base reaction. (6 pts total, 3 pts per blank)

 $H Cl (aq) + Li OH (aq) \rightarrow$ (aq) +

Given the following Lewis Dot structure and the following 3 dimensional structure complete the 10. following mostly about the atom with the * (9 pts total, 1 pt per letter)



a. What is the **VSEPRT** # electron pairs around the atom with the *?

How many lone pair electrons (if any) are on the atom with the *? b.

c. What is the VSEPRT geometry of electron pairs around the atom with the *?

d. What is the **VSEPRT geometry of the molecule** around the atom with the * ?

e. What is the bond angle around the atom with the *?

What is the **hybridization** of the atom with the * ?

g. Draw dipole moment arrows on all bonds from the atom with the * on the 3 dimensional structure.

h. Vector sum of the dipole moment arrows is [(zero) or (not zero)] (circle one)

i. Is the molecule as a whole [(polar) or (nonpolar)]? (circle one)

<u>Part III.</u> <u>Long Answer</u> Please <u>show work</u> for full credit and to receive partial credit. (68 pts)

**** Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.****

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work

1. This is the Dimensional Analysis problem. Problems are written to give a particular answer illustrating certain concepts in the calculation and may not be experimentally reasonable. (18 pts)

For the following reaction, if you start with 1.577 grams of K(s), how many liters of product $H_2(g)$ will you generate at STP? (22.4 Liters = 1 mole gas at STP) (molar mass K = 39.10 g/mole) [assume that the grams of K(s) is the limiting reagent] (The following reaction is a balanced reaction.)

 $2 \text{ K (s)} + 2H_2O (l) \rightarrow 2 \text{ KOH (aq)} + H_2 (g)$

electron configuration, Lewis Dot, type LA problem (26 pts total) 2

For the molecule

HCO NHCl

- Give the valence electron configuration for the molecule. (show work) (7 pts) a.
- N (7 pts) Give the Lewis Dot Symbol for the atom b.
- Given the following Lewis Dot Structures, choose the correct Lewis Dot structure by circling the c. correct number. (6 pts)

Explain why the Lewis Dot structure which you did not choose is incorrect. For full credit, you d. must give at least 2 reasons. (6 pts)

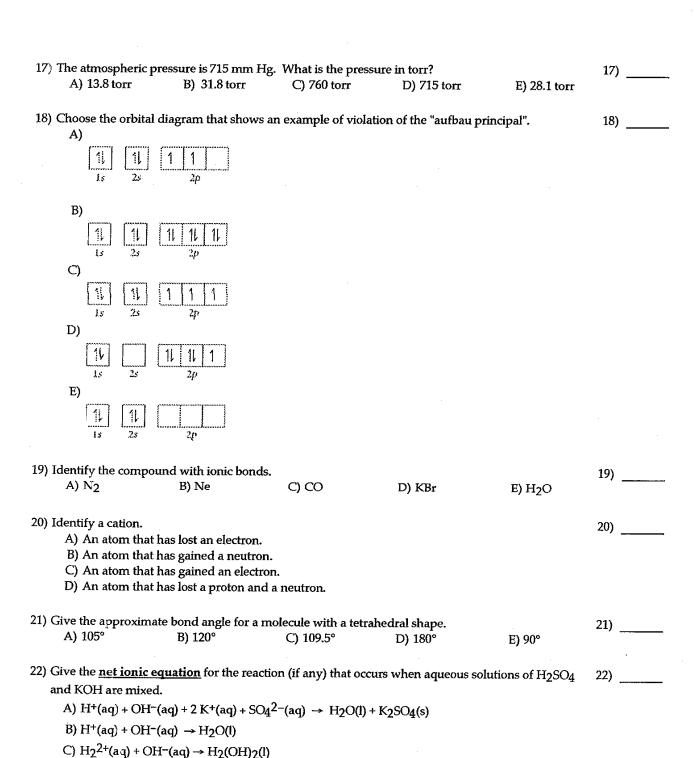
- 3 Other type LA problem. (24 pts total)
- a. If you have 78.5 grams of Na OH and dissolve it in distilled water to make a solution of total volume 0.555 Liters, what is the molarity of the solution? (molar mass NaOH = 40.01 grams / mole) (12 pts)

b. How many molecules [actually the accurate term would be number of formula units (not molecules) before dissociation] of NaOH do you have in your solution? (Avogadro's number = 6.022×10^{23}) (show work) (12 pts)

Final General Chemistry I Lecture Sp	oring 2014 4/24/14 T	Thursday form 9:55 A	Dr. Hahn Exam	#
Name	(print) N	lame		(sign)
Please show work for partial credit and f Multiple choice questions have no partia I obviously cannot grade it. (2 pts print and clearly tell me where the remaining	l credit. Please write and sign exam) If yo	anything you want grad ou run out of space , ple	led legibly. If I cannot asse continue on the scra	read your work atch paper page
answers, I will not even look at the scra	itch paper. (Avogadi	o's number = 6.022 x 10	23 (1 atm = 760 mm)	Hg = 760 torr
(Kelvin = ${}^{\circ}C$ + 273.15)(PV=nRT, R = 0	.08206 (L atm)/(mol K	$(P_1 V_2) / (P_1 V_1) = T_2$	2/T ₁ }	
If you are a graduating senior, please circ graduation.	cle (graduating	senior) here so tha	at I submit your grades	on time for
Part I MULTIPLE CHOICE. Choose to No partial credit for MC. (2 pts per que	he one alternative the stion, ## pts pts total)	nt best completes the st	atement or answers the	e question.
1) Give the temperature and pres	ssure at STP (standard	pressure and atmosphe	ere).	1)
A) 32K and 1 torr Hg	•			
B) 0°C and 1 mm Hg				
C) 0°C and 1.00 atm				
D) 25°C and 1.00 in Hg				
E) 0K and 1.00 atm				
2) Which of the following and				•
 Which of the following are exa A) salt is dissolved in water 		nger		2)
B) water (solid) to water (lic				`
C) water freezes	imaj			
D) melt solid gold to liquid a	zold			
E) All of these are examples				
Which of the following elemen	ts is a alkali metal?			3)
A) K B) N	C) Be	D) Ce	E) Br	-
4) Of the following elements, whi	ch has the highest elec	tronegativity?		4)
	Si	C) Ti	D) P	4)
•		- ,	~, ~	
5) The factor 10 ⁻³ corresponds to	which prefix?			5)
-	deci	C) centi	D) milli	J)
, -,		c) cond	D) IIIII	
6) Which one of the following con	npounds is soluble in	water?		6)
	Ĉu ₃ (PO ₄) ₂	C) Pb(NO3)2	D) ĈoS	-,
	 .		•	
7) Give the name for HNO3.				7)
A) hydrogen nitrite				· ,
B) hydrogen nitrate				
C) nitrous acid				
D) hydrogen nitride				
E) nitric acid				
Dr. Hahn General Chemistry I	Lecture Final	Spring 2014	9:55 form A page	1

1

8) Which of the following elements is a nonmetal?							
	A) K	B) N	C) Be	D) Br	E) Ce	8)	
9) NO	O2 is an example o	f				9)	
	A) a homogeneou	s mixture.	B) a	compound.		-	
	C) a heterogeneou			n element.			
10) A t	riple covalent bon	d contains	of electrons.			10)	
	A) 0 pairs	B) 2 pairs	C) 4 pairs	D) 1 pair	E) 3 pairs	/	
11) A c	ovalent bond is be	est described as				11)	
1	A) the sharing of e	lectrons between	atoms.			,	_
•	B) a bond betweer	n a metal and a no	onmetal.				
(a bond betweer	two polyatomic	ions.				
I	D) a bond betweer	n a metal and a po	olyatomic ion.				
,	E) the transfer of e	electrons.					
12) The	distance betweer	n adjacent crests i	n a wave is called			12)	
	A) median					,	
]	B) frequency						
	C) area		•				
)) wavelength						
	E) amplitude						
13) Wh	ich of the followin	g exists as a diato	mic molecule?			13)	
	a) lithium					,	
	3) krypton						
	C) bromine						
)) carbon						
I	E) phosphorus						
14) The	total pressure of a	gas mixture is th	e sum of the partial p	pressure of its compo	nents is known as	14)	
(oth	erwise in equatior	$1 \text{ form: } P_T = P_a + P_a$	P _b + P _c)	•		,	_
Α) Avogadro's Law	7					
H	3) Charles's Law						
C	') Dalton's Law						
. D) Ideal Gas Law						
E	l) Boyle's Law						
15) Hov	v many H+ ions ca	n the acid. H2SO	4 , donate per moleci	ıle?		15)	
) 2	B) 0	C) 3		D) 1	10)	
	, -	2,0	C/3	ı	<i>)</i>) 1		
	cribe the shape of	a s orbital.				16)	
) three balls					,	_
) spherical						
) four balls						
) dumbbell shaped	d					
. Е) eight balls						
			•				



D) $2 K^{+}(aq) + SO_4^{2-}(aq) \rightarrow K_2SO_4(s)$

E) No reaction occurs.

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want

me to	grade it, clearly i	ndicate where l	I can find you	ir work. (86 pts)
1 unfam	From the given li iliar with the symb	st, circle all con ols for the elem	apounds. You lents. (8 pts, 2	n may want to look at the periodic table if you are 2 pts each)
Br ₂	$_{ m H_2O}$	Zn	FeCl ₂	
2. not cir	From the list of models of the entire com	tolecules shown pound not parts	below circle of a compour	all ionic compounds. I am asking you to circle (or to ad formula. (8 pts, 2 pt each)
Li ₂ S	NO ₂	NH4Cl	O_2	ı
3 do not	For the following count off for small	either fill in the spelling errors	blank with th in naming ele	e element symbol or the word for the element name. (I ments.) (6 pts, 3 pts each)
I	. ,		potassium	

Fill in each parenthesis with <u>one</u> of the following letters. The letters may be used once, many times or not at all. (You must use one of the letters shown below. If you reply for instance for d block as d instead of (j), I will count off full credit.) (10 pts total, 5 pts each)
(a)transition metal elements (b) chalcogen (c) main group element (d) alkali metals (e) actinide / lanthanide (f) alkaline earth metals (g) halogens (h) s block elements (i) p block elements (j) d block elements (k) f block elements
Periodic Table of the Elements Maria Mari
2 LU 10 LO 2 LO
For the following questions, use the exact designation as shown on the periodic table which you have in front of you attached to your exam. Do not use the labels from the periodic table on the wall of the room or any other labeling other than the exact labels from the periodic table you have with your exam. Do not convert roman numbers to Arabic numbers or visa versa. (i.e. do not convert roman numeral V to Arabic number 5 or 5 to V) (12 pts total, 3 pts each)
For the element Si
Period number is (a) Group number is (b)
number protons (c) number electrons (d)
Write the correct ionic formula for the following elements. To write the correct ionic formula, you are going to do (a) & (b) below. If you show work you may earn some partial credit on part (a). You must show work for part (b) (9 pts total, 3 pts each)
Al and S
a. charge on Al charge on S (6 pts, 3 pts each)
b. correct formula is(1 pts, 2 pts show work) (show work)

7 a. Balance the following react zero. You may leave the blank empty wh	tion by filling in the blanks. ich means the number one go	The blanks canno	ot be filled with a (3 pts per blank)
$2 \text{ CO (g)} + O_2 \text{ (g)} \rightarrow \underline{\qquad} \text{CO}_2(\text{g})$)		
b. Please show how many of each typ balancing the reaction. (6 pts)	e of atom is in both sides of	the equation after	you complete
atoms in reactant side	atoms on pro	oduct side	
8. (a). Is the compound Al PO ₄ [(solub	le) or (insoluble)] (circle one	e) in water? (3 pt)	
(b) Write out the molecular form of the foll filling in the blanks and then (2) circling need to be balanced. (6 pts total, 2 pt each	g either (s) or (aq) by each 1	giving the expect product. The re	ted products by (1) eaction does not
AlCl ₃ (aq) + Na ₃ PO ₄ (aq) \rightarrow one	[(s)or(aq)]circle one	÷	[(s)or(aq)]circle
9. Complete the following acid base re	action. (6 pts total, 3 pts per	blank)	
HF (aq) + Na OH (aq) →	(ao) +	(I)	

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10. Given the following Lewis Dot structure and the following 3 dimensional structure complete the following mostly about the atom with the * (9 pts total, 1 pt per letter)

a. What is the **VSEPRT** # **electron pairs** around the atom with the *?

How many lone pair electrons (if any) are on the atom with the *? b.

c. What is the **VSEPRT geometry of electron pairs** around the atom with the *?

d. What is the **VSEPRT geometry of the molecule** around the atom with the *?

e. What is the **bond angle** around the atom with the *?

f. What is the **hybridization** of the atom with the *?

g. Draw dipole moment arrows on all bonds from the atom with the * on the 3 dimensional structure.

h. Vector sum of the dipole moment arrows is [(zero) or (not zero)] (circle one)

i. Is the molecule as a whole [(polar) or (nonpolar)]? (circle one)

<u>Part III.</u> Long Answer Please show work for full credit and to receive partial credit. (68 pts)

**** Please attempt every problem for partial credit. You will get no partial credit if you just rewrite the question with no change in anything.****

Please show all work on this exam itself. If you are going to show work on the scratch paper and want me to grade it, clearly indicate where I can find your work

1. This is the Dimensional Analysis problem. Problems are written to give a particular answer illustrating certain concepts in the calculation and may not be experimentally reasonable. (18 pts)

For the following reaction if you start with 25.7 mL of a 0.15 M solution of the H Cl (aq), what is the theoretical yield of the CaCl₂ in grams (assuming that you are able to get out the solid CaCl₂ after the end of the reaction by evaporation)? (molar mass CaCl₂ = 111.08 grams / mole) (show work)

 $2 \text{ HCl (aq)} + \text{Ca (OH)}_2 \text{ (aq)} \rightarrow \text{CaCl}_2 \text{ (aq)} + 2 \text{ H}_2\text{O (l)}$

2 electron configuration, Lewis Dot, type LA problem (26 pts total)

For the element **Sb**, (show work if appropriate) (26 pts)

- a. What is the atomic mass? (3 pts)
- b. What is the atomic number? _____ (3 pts)
- c. How many valence electrons? (explain or show work) (3 pts)
- d. Give the electron configuration in the format (1s², 2s², format only gives format & has no information about what the answer looks like.) (6 pts)
- e. Give the valence electron configuration in the format (1s², 2s², format only gives format & has no information about what the answer looks like.) (6 pts)
- f. Give the valence electron configuration diagram in the format ($\frac{1}{1s}$) $\frac{1}{2s}$ $\frac{1}{2p}$ ) (format only gives format and has no information about the answer) (5 pts)

3 Other type LA problem. (24 pts total)

If you do a reaction which produces 25.2 Liters of a gas CH₄ and collect it in a gas cylinder at 1.022 atmosphere, 299.2 Kelvin.

a. How many molecules of CH₄ do you have in that volume of gas approximately? (22.4 Liters = 1 mole of gas) (You may assume that the molar volume at STP is close enough at this nonstandard condition to get a good approximate number for this question.) (Avogadro's number = 6.022 x 10²³) (show work) (12 pts)

b. If you close the gas cylinder opening and then check the condition of the gas cylinder contents you find that the pressure is 1.52 atmosphere, temperature is 304.2 Kelvin. What is the new volume? $[(P_2V_2)/(P_1V_1) = T_2/T_1]$ (show work) (12 pts)

Final	General Chemistry I	Lecture Spring 2014	4/24/14 Thursday	form 9:55 B L	or. Hahn Exan	n#
Name			(print) Name			(sign)
Multij I obv and cl	e show work for partial cole choice questions have iously cannot grade it. (early tell me where the early tell not even look	e no partial credit. I (2 pts print and sign o remaining answer ca	Please write anything exam) If you run ou in be found. <u>If you d</u>	you want graded it of space , please on't tell me to loo	legibly. If I cannot continue on the sc k on the scratch pa	t read your work, ratch paper page aper for
	in = °C + 273.15)(PV=					
If you gradu	are a graduating senior, ation.	, please circle (g 1	aduating senior)	here so that I	submit your grade	s on time for
	MULTIPLE CHOICE ortial credit for MC. (2 p			ompletes the state	ment or answers t	he question.
	1) Give the name for I	HNO3.				1)
	A) hydrogen nitr B) hydrogen nitr C) hydrogen nitr D) nitrous acid E) nitric acid	rate				
	2) Identify the compo	und with ionic bonds	5 .			2)
	A) H ₂ O	B) KBr	C) Ne	D) N ₂	E) CO	
	3) A triple covalent bo	ond contains B) 0 pairs	_ of electrons. C) 4 pairs	D) 3 pairs	E) 1 pair	3)
	B) An atom that C) An atom that	has gained an electro has gained a neutron has lost an electron. has lost a proton and	1.			4)
	5) The factor 10 ⁻³ corn	responds to which p	refix?			5)
	A) milli	B) deci	C) cent	ti .	D) deka	,
	6) Which of the follow A) phosphorus	ring exists as a diaton	nic molecule?			6)
	B) carbon C) bromine D) krypton E) lithium					
	7) How many H+ ions	can the acid, H2SO4	, donate per molecu	le?		7)
	A) 2	В) 0	C) 3		D) 1	
	Dr. Hahn General	Chemistry I Lecture	Final S	pring 2014 9	:55 form B page	1

8) Choose the orbital diagram that shows an example of violation of the "aufbau principal".	8)
A)	
ts 2s 2p	
B)	
11 11 11 11 11 11 11 11 11 11 11 11 11	
1s 2s 2p	
C)	
1s 2s 2p	
D)	
1s 2s 2p	
E)	
1s 2s 2p	
9) Give the temperature and pressure at STP (standard pressure and atmosphere).	9)
A) 0°C and 1.00 atm	
B) 25°C and 1.00 in Hg	
C) 0°C and 1 mm Hg D) 0K and 1.00 atm	
E) 32K and 1 torr Hg	
,	
10) A covalent bond is best described as	10) _
A) a bond between a metal and a nonmetal.	
B) a bond between two polyatomic ions.	
C) a bond between a metal and a polyatomic ion.D) the transfer of electrons.	
E) the sharing of electrons between atoms.	
11) The total pressure of a gas mixture is the sum of the partial pressure of its components is known	as 11) _
(otherwise in equation form: $P_T = P_a + P_b + P_c$)	
A) Boyle's Law	
B) Charles's Law C) Avogadro's Law	
D) Ideal Gas Law	
E) Dalton's Law	
12) NO ₂ is an example of	12) _
A) an element. B) a heterogeneous mixture. C) a compound. D) a homogeneous mixture.	
C) a compound. D) a homogeneous mixture.	
, , , , , , , , , , , , , , , , , , ,	13)
13) Give the approximate bond angle for a molecule with a tetrahedral shape. A) 109.5° B) 105° C) 180° D) 90° E) 120°	13)

14) Of the following e	lements. which has	the highest electron	egativity?		14)
A) Ge	В) Р	C) 9		D) Ti	
15) The distance betw	een adiacent crests	in a wave is called			15)
A) wavelength				•	, <u></u>
B) area C) median					
D) amplitude					
E) frequency					
16) Which of the follo	wing elements is a r	onmetal?			16)
A) K	B) N	C) Be	D) Ce ·	E) Br	
17) Which of the follo	wing are examples	of physical change?			17)
A) salt is dissolv					
B) melt solid go C) water freeze	old to liquid gold				
•	to water (liquid)				
E) All of these a	are examples of phy	sical change.			
18) Give the net ionic	equation for the re	action (if any) that o	ccurs when aqueous	s solutions of H ₂ SO ₄	18)
and KOH are mixe	ed.				
A) $2 K^{+}(aq) + S0$	O4 ²⁻ (aq) → K2SO4	(s)			
B) H+(aq) + OH	$H^-(aq) \rightarrow H_2O(l)$				
C) H ₂ ²⁺ (aq) + ($OH^-(aq) \rightarrow H_2(OH)$	2(1)			
D) H+(aq) + OH	I-(aq) + 2 K+(aq) + 5	604^2 -(aq) \rightarrow H ₂ O(l) + K ₂ SO ₄ (s)		
E) No reaction of	occurs.				
19) Describe the shape	e of a s orbital.				19)
A) eight balls					
B) four balls C) three balls					
D) spherical					
E) dumbbell sh	aped				
20) The atmospheric p	ressure is 715 mm I	Ig. What is the pres	sure in torr?		20)
A) 760 torr	B) 31.8 torr	C) 28.1 torr	D) 13.8 torr	E) 715 torr	
21) Which of the follow	wing elements is a a	lkali metal?			21)
A) Ce	B) K	C) Be	D) N	E) Br	
22) Which one of the f					22)
A) CoS	B) Pb(NC	(3)2 C) C	Cu3(PO4)2	D) ZnCO3	

Part II Short Answer: Write the word or phrase or circle the choice that best completes each statement or answers the question. Some questions may require that you show work. If you do not show work, you may lose points. Even on questions which do not require work, if you legibly show work, you may get some partial credit.

Please show all work on this exam itself. If you are going to show work on the scratch paper and want

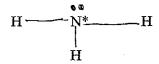
		ndicate where I		ur work. (86 pts)
		st, circle all elen		nay want to look at the periodic table if you are 2 pts each)
Br ₂	H ₂ O	Zn	FeCl ₂	
2. From to not circ	rom the list of n	nolecules shown ompound not pa	below circle	all covalent compounds. I am asking you to circle (or ound formula. (8 pts, 2 pt each)
Li ₂ S	NO_2	NH ₄ Cl	O	2
				the element symbol or the word for the element name. (I ements.) (6 pts, 3 pts each)
N			copper _	

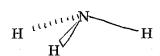
or not at all. (You n		ers shown below.	s. The letters may be used once If you reply for instance for d b ach)	
(e) actinide / lant		e earth metals (g)	roup element (d) alkali met halogens (h) s block elements	
			() element	
	Per	odic Table of the Elemen	nts	
	1000 CCC	X6 X7 X8 X8 X8 X8 X8 X8 X8	\$10 \ \frac{1}{10} \\ \frac{1}{10} \frac	
		G T M Par See La GG Th D Ho Th A G See As Co H C A		
in front of you attach or any other labeling convert roman numb	ed to your exam. Do nother than the exact lal	not use the labels fro pels from the period or visa versa. (i.e.	s shown on the periodic table we can the periodic table on the wallic table you have with your example do not convert roman numer	ll of the room im. Do not
Period number is (a)	· 	Group num	aber is (b)	
number protons (c)		number ele	ctrons (d)	
are going to do (a) &	rect ionic formula for the (b) below. If you show (9 pts total, 3 pts ea	w work you may ea	nts. To write the correct ionic term is to the some partial credit on part (a	formula, you 1). You must
Ca and N				
a. charge on Ca		charge on N	(6 pts, 3 pts each)	
a. correct formu	la is	(1 pts,	, 2 pts show work) (show work))

			owing reaction by the company which is				
2 SO ₂ (§	g) + O ₂	(g) →	SO ₃ (g)				
		w how many the reaction.	of each type of (6 pts)	atom is in both	sides of the equ	uation after y	ou complete
atoms in	ı reactant	side		ato	ms on product s	ide	
8(a). Is	s the comp	ound Mg (OH) ₂ [(soluble)	or (insoluble)]	(circle one) in v	water? (3 pt)	
filling ir	n the blan	ks and then	m of the followin (2) circling eit tal, 2 pt each bla	her (s) or (aq)	by each produ	g the expecte ct. The rea	ed products by (1) action does not
Mg(NO ₃ one	3)2(aq) + C	a(OH) ₂ (aq)	>	[(s)or(aq)]	circle one +	·	[(s)or(aq)]circle
9. (Complete t	he following	acid base reaction	on. (6 pts total,	, 3 pts per blank	:)	
H I (aq)	+ Li OH	(aq) -> _		(aq) +	5.7500	_ (l)	

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10. Given the following Lewis Dot structure and the following 3 dimensional structure complete the following mostly about the atom with the * (9 pts total, 1 pt per letter)





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- How many lone pair electrons (if any) are on the atom with the *? b.
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- e. What is the bond angle around the atom with the *?
- What is the hybridization of the atom with the * ?
- g. Draw dipole moment arrows on all bonds from the atom with the * on the 3 dimensional structure.
- h. Vector sum of the dipole moment arrows is [(zero) or (not zero)] (circle one)
- i. Is the molecule as a whole [(polar) or (nonpolar)]? (circle one)

<u>Part III. Long Answer</u> Please <u>show work</u> for full credit and to receive partial credit. (68 pts)

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2 electron configuration, Lewis Dot, type LA problem (26 pts total)

For the element Ga, (show work if appropriate) (26 pts)

- a. What is the atomic mass? _____(3 pts)
- b. What is the atomic number? _____(3 pts)
- c. How many valence electrons? (explain or show work) (3 pts)
- d. Give the electron configuration in the format (1s², 2s², format only gives format & has no information about what the answer looks like.) (6 pts)

- e. Give the valence electron configuration in the format (1s², 2s², format only gives format & has no information about what the answer looks like.) (6 pts)
- f. Give the valence electron configuration diagram in the format $(\frac{1}{1s} \frac{1}{2s} \frac{1}{2s} \frac{1}{2p} \frac{1}{2p} \frac{1}{2p} \frac{1}{2p}$ (format only gives format and has no information about the answer)

3 Other type LA problem. (24 pts total)

If you do a reaction which produces 1.77 Liters of a gas CH₄ and collect it in a gas cylinder at 0.982 atmosphere, 278.2 Kelvin.

a. How many molecules of CH₄ do you have in that volume of gas approximately? (22.4 Liters = 1 mole of gas) (You may assume that the molar volume at STP is close enough at this nonstandard condition to get a good approximate number for this question.) (Avogadro's number = 6.022×10^{23}) (show work) (12 pts)

b. If you close the gas cylinder opening and then check the condition of the gas cylinder contents you find that the pressure is 2.75 atmosphere, temperature is 270.2 Kelvin. What is the new volume? $[(P_2V_2)/(P_1V_1) = T_2/T_1]$ (show work) (12 pts)