Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multip choice questions have no partial credit. Please write anything you want graded legibly. If you run out of space, please continue on the empty back pages but clearly label where the remaining answer can be found. (If I can't find your answer or cannot read it, I obviously cannot grade it). Return your entire exam including the periodic table.

(Please count your exam pages and make sure there are 3 real pages + periodic table+ Lewis Dot Structure direction.)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts each, 26 pts total)

1) Choose the best Lewis structure for SO_4^2 .

1) _____

- $\begin{bmatrix} \ddot{o} \\ \vdots \ddot{o} \ddot{s} \ddot{o} \vdots \\ .o. \end{bmatrix}^{2}$
- :ö: :ö: :ö: :o:
- $\begin{bmatrix}
 \vdots & \vdots \\
 \vdots$
- 2) What is the maximum number of d orbitals that are possible?
 A) 9
 B) 1
 C) 7

2) _____

D) 5

E) 3

1

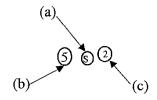
A) 5	B) 9	C) 18	D) 3	E) 7	
4) Give the numb numbers)	ers for m_ℓ (magnetic	: quantum number	rs) for $\ell=1$ (angular	momentum quantum	4) .
A) +2, -1, 0,	1, 2 B) 0, 1		C) -1, 0, 1	D) 1, 2	
5) Identify the sho	ortest bond				 \
A) single cov					5)
B) double co					
C) triple cov					
D) all of the a	above bonds are the	same length			
6) Which reaction	below represents th	e first ionization o	of O?		
A) O(g) - O	r(g) + e ⁻	io anot formadattore o	<i>a</i> O:		6) _
B) O (g) + e					
C) O (g) - C					
D) O(g) + e ⁻ -					
E) O (g) + e	→ O ²⁻ (g)				
7) Identify the spe	cies that has the sma	allect radius			
A) N-2	B) N ⁰		=		7) _
13) 14 -	b) N°	C) N+3	D) N ⁻⁵	E) N+1	7) _
8) The distance bet	ween adjacent crest	s of a wave is calle	ed		8)
A) frequency	•				ا (٥)
B) area					
C) wavelengt					
D) amplitude					
E) median					
9) A cation of +2 in	dicates that an elem	ent has			0)
A) gained two	protons.				س رو
B) lost two ne					
C) gained two	electrons.				
D) lost two pro		•			
E) lost two ele	ectrons.				
(0) Describe the shap	pe of a p orbital,				10\
A) three balls					10) _
B) dumbbell si	haped			•	
C) spherical					
D) four balls					

11) Which of the followi	ng elements can fo	orm compounds	with an expanded	octet?	11)	1)
A) C		-	. *		, _	
B) F						
C) Li						
D) Se						
E) All of the above	e elements can for	m compounds v	vith an expanded o	ctet.		
12) How many different principal level?	values of ℓ (angul	ar momentum (quantum number) a	re possible in the third	12) _	B
A) 4	B) 3	C) 1	D) 0	E) 2		
13) For $n = 3$ (principal quantum numbers), what are the possible values of ℓ (angular momentum quantum numbers)?						<i>h</i>
A) 0, 1, 2	B) 0, 1	1	C) 0, 1, 2, 3	D) 0		

II. Short Answers (41 pts)

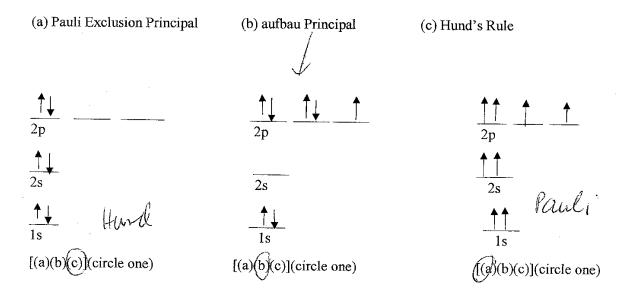
- 1. Matching: Match the following with the description by filling in the blank with one of the letters. Each letter can only be used ONE time. (9 pts total, 3 pts each)
 - (a) n, principal quantum number
 - (b) m_{t_1} magnetic quantum number
 - (c) ℓ , angular momentum quantum number
 - determines the shape of the orbitals in the subshell, subshell, goes with the s block, p block, d block or f block of the periodic table
 - determines how far away from the nucleus the electron is located, also the shell or period number of the periodic table
 - determines the orientation of the orbitals (example: $x = p_x$ direction p_x $y = p_y$ direction p_z
- 2. Match the following by filling in the blank with one of the letters. Each letter may only be used ONE time (9 pts each, 3 pts each)

for the symbol $5s^2$



- gives the subshell or shape of the orbitals in the subshell
- gives principal quantum number of shell
- gives the number of electrons in the designated subshell

3. Match the name of the electron configuration rule with the orbital diagram which shows a violation of the electron configuration rule by circling one of the letters under each electron orbital diagram. (9 pts total, 3 pts each)



4. Which of the following shows a <u>covalent bonding</u> Lewis Dot Structure reaction for the formation of an <u>covalent bond</u>. Circle the letter of the correct reaction. (5 pts)

Reaction (a)
$$Csx + Br \cdot Arr \cdot Arr \cdot Br \cdot Arr \cdot Arr \cdot Br \cdot Arr \cdot$$

- 5. Periodic Trends: (9 pts total, 3 pts each letter)
- (a) Circle the element which has a <u>larger atomic radius</u> [(C) or (F)] (circle one)
- (b) Circle the element which has a higher first ionization energy [C or (F)] (circle one)
- (c) Circle the element which has <u>higher electronegativity</u> [(B) or F) (circle one)

III. wo	Long Answer (34 rk, you will lose point	pts) Please show work. Ints.	If you get the final cor	ect number without show	ing your
	1. For the element	<u>Br</u> (18 pts total, 3 pts	s each letter)		
(a)	Give the electro	n configuration of the ele	ment above in the form	$(1s^2 \ 2s^2 \ 2n^6)$	
		52, 2p6, 3.			465
(b)	Give the <u>valence</u>	electron configuration of	the same element in th	e format. $(1s^2, 2s^2, 2p^6,$.)
	, ,	485		, , , , , , , , , , , , , , , , , , ,	,
(a)	Cirro 41	1			
(c)	Give the <u>valence</u>	electron configuration of t	he anion Br^{-1} in the f	ormat $(1s^2, 2s^2, 2p^6,)$	
	710	452, 4	4p6	(BA	-12
(d)	Give the <u>valence</u>	electron configuration diag	gram for the same elem	ent showing a line for an	- 1 % 1
and (for the +1/2 and -1/2 electrons $\frac{1}{2}$ is $\frac{1}{2}$ $\frac{1}{2}$			orditai
	;	1	1 1 1 40	ratery)	
		<i>(</i>)	48	3	
(e)	How many valence	e electrons does the elemen	nt have ?	e e	
(f)	Give the Lewis Do	symbol (Lewis dot structu	ire) for the same eleme	nt by itself	P
	Dr. Hahn	General Chemistry I	Exam III White	11/14/16	6

- 2. Complete the following about the same Lewis Dot structure. (16 pts total)
- (A) For the molecule below with the molecular formula (Cl N C₂ O H₄), give the total number of valence electrons in the entire molecule. Show work. (6 pts)

$$CI - N - C - C - H$$

(a)

(b)

 $I > X = 20e$

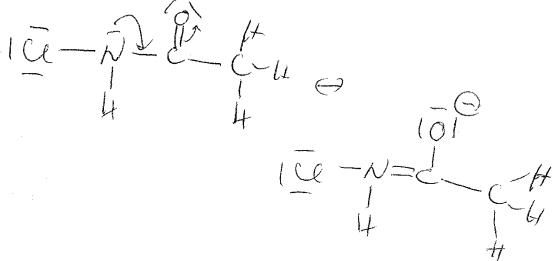
(C) For the Lewis Dot structure which you chose in part (B), explain why the one you <u>did not</u> choose is incorrect by <u>doing an electron count</u> and explain why you did not choose this Lewis Dot structure. (4 pts)

(D) Give one other explanation of why the structure that you did not choose is incorrect. (2 pts)

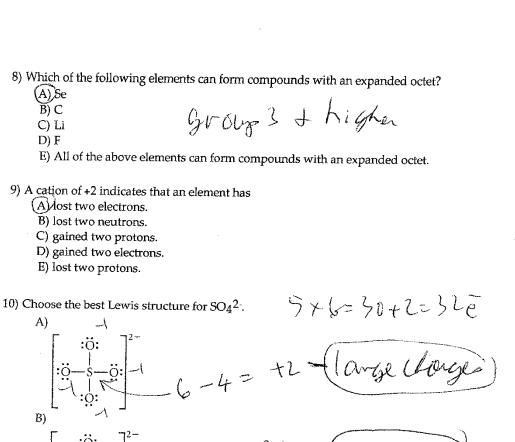
Och cue more than octet-Let cellemed Gurkum medanics 2 H con only have duet

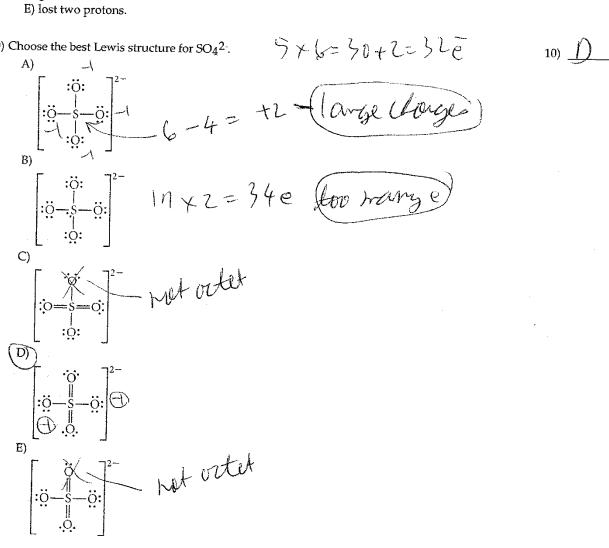
@ N cornet Lau More Chan ortet

(E) For the Lewis Dot structure which you chose in part (A) above, draw one valid <u>resonance structure</u>. (2 pts)



General Chemistry I Lectur	e Fall 2016 11/14/1	6 M Exam III for	m Pink Dr. Hahr	n Exam#	=
Name	<u> </u>	(print) Name	?		(sign)
Please show work for partie choice questions have no partie continue on the empty back cannot read it, I obviously of (Please count your exam parties)	ll credit and full creditial credit. Pleas pages but clearly I annot grade it). Rei	dit on the Long Ans e write anything yo abel where the rema turn your entire exa	swers and in some on the want graded legit aining answer can learn including the pe	of the Short Answer Quibly. If you run out of be found. (If I can't fineriodic table.	space , please d your answer or
MULTIPLE CHOICE. Cho 26 pts total)	ose the one alternat	tive that best comp	letes the statement	t or answers the quest	ion. (2 pts each,
1) Describe the shap A) four balls B) three balls C) dumbbell sh D) eight balls		<i>>O</i>			1)
E) spherical 2) For $n = 3$ (principal quantum numbers $\stackrel{\frown}{A}$ 0, 1, 2	il quantum numbers s) ? B) 0	s), what are the poss		angular momentum D) 0, 1, 2, 3	2) <u>A</u>
3) The distance betw (A) wavelength B) frequency C) amplitude D) median E) area	een adjacent crests o	of a wave is called	1- 0. 1	f.	3) A
4) Identify the species A) N^0	B) N+1	st radius. C) N ⁻⁵	tan smill D) N-2	E) N+3	4)
5) How many orbitals a given atom?	are contained in the	e third principal lev	rel ($n = 3$, principal	quantum number) of	5)
A) 3 6) Which reaction below A) O(g) + e - O B) O'(g) + e - O C) O(g) - O'(g) D) O'(g) - O(g) E) O'(g) + e - O	(g) (g) +e- +e-	C) 7 cl st ionization of O?	(D) 9	E) 18	6)
7) Give the numbers for numbers) A) -2, -1, 0, 1, 2	or m_ℓ (magnetic quar 	ntum numbers) for -1 , 0 , $+1$	l	entum quantum D) 0, 1	7)
Dr. Hahn General	Chemistry I Lecture	Exam III	Fall 2016 f	form Pink page	1

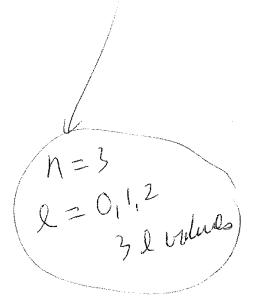




- 12) How many different values of ℓ (angular momentum quantum number) are possible in the third principal level?
- 12) <u>A</u>

- (A)3
- B) 4
- C) 2
- D) 1
- E) 0

- 13) Identify the shortest bond.
 - A) single covalent bond
 - (B) triple covalent bond
 - C) double covalent bond
 - D) all of the above bonds are the same length

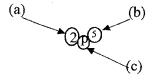


II. Short Answers (41 pts)

- 1. Matching: Match the following with the description by filling in the blank with one of the letters. Each letter can only be used ONE time. (9 pts total, 3 pts each)
 - (a) ξ angular momentum quantum number
 - (b) n, principal quantum number
 - (c) m_f, magnetic quantum number

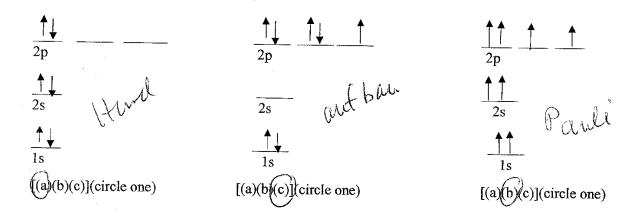
 - $\frac{1}{2}$ determines how far away from the nucleus the electron is located, also the shell or period number of the periodic table
 - determines the shape of the orbitals in the subshell, subshell, goes with the s block, p block, d block or f block of the periodic table
- Match the following by filling in the blank with one of the letters. Each letter may only be used ONE time (9 pts each, 3 pts each)

for the symbol 2p⁵



- gives the number of electrons in the designated subshell
- gives principal quantum number of shell
- gives the subshell or shape of the orbitals in the subshell

- 3. Match the name of the electron configuration rule with the orbital diagram which shows a violation of the electron configuration rule by circling one of the letters under each electron orbital diagram. (9 pts total, 3 pts each)
 - (a) Hund's Rule
- (b) Pauli Exclusion Principal
- (c) aufbau Principal

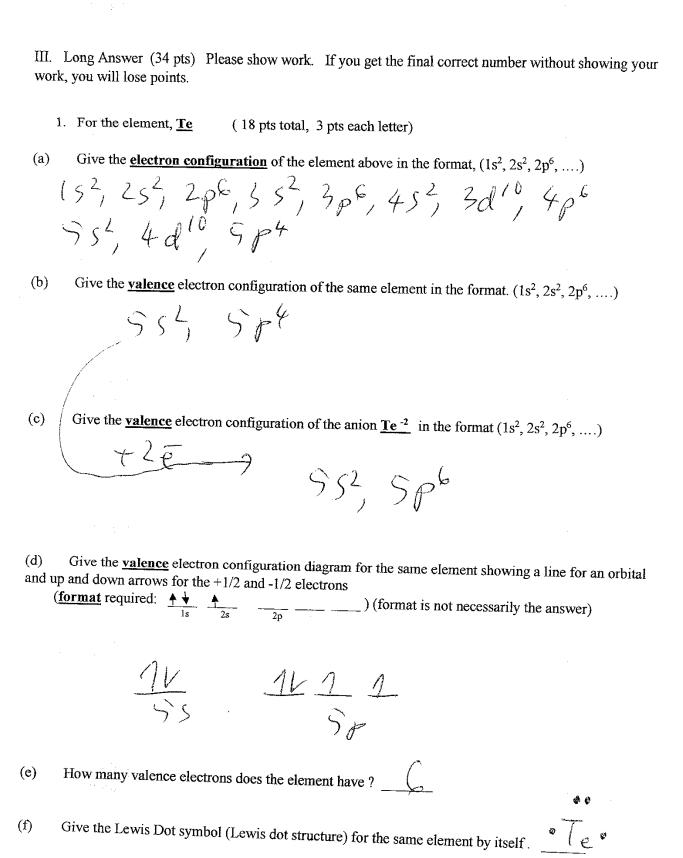


4. Which of the following shows an <u>ionic bonding</u> Lewis Dot Structure reaction for the formation of an <u>ionic bond</u>. Circle the letter of the correct reaction. (5 pts)

Reaction (a)
$$Cs \times + Br \stackrel{\bullet}{\circ} \rightarrow Cs \stackrel{\star}{\times} Br \stackrel{\bullet}{\circ}$$

Reaction (b) $\stackrel{\star}{\times} Cl \stackrel{\star}{\times} + Br \stackrel{\bullet}{\circ} \rightarrow Cl \stackrel{\star}{\times} Br \stackrel{\bullet}{\circ}$

- 5. Periodic Trends: (9 pts total, 3 pts each letter)
- (a) Circle the element which has a <u>larger atomic radius</u> [(C) or (Sn)] (circle one)
- (b) Circle the element which has a <u>higher first ionization energy</u> [(Sn)/or (C)] (circle one)
- (c) Circle the element which has <u>higher electronegativity</u> ((F) or (I)] (circle one)



- 2. Complete the following about the same Lewis Dot structure. (16 pts total)
 - (A) For the molecule below with the molecular formula (Cl C₂ O H₃), give the total number of valence electrons in the entire molecule. Show work. (6 pts)

(a)

(C) For the Lewis Dot structure which you chose in part (B), explain why the one you <u>did not</u> choose is incorrect by <u>doing an electron count</u> and explain why you did not choose this Lewis Dot structure. (4 pts)

(D) Give one other explanation of why the structure that you did not choose is incorrect. (2 pts)

Of only has duet Of has more than outst-rat allowed By quantum wellances

(E) For the Lewis Dot structure which you chose in part (A) above, draw one valid <u>resonance structure</u>.

orreltate but C met outet

Name	(print) Name	(sign)
Please show work for partial credit and full crechoice questions have no partial credit. Pleas continue on the empty back pages but clearly cannot read it, I obviously cannot grade it). Re(Please count your exam pages and make sure	se write anything you want graded legib label where the remaining answer can be eturn your entire exam including the per	the Short Answer Questions. Multipoly. If you run out of space, please e found. (If I can't find your answer or iodic table.
MULTIPLE CHOICE. Choose the one alterna 26 pts total)	tive that best completes the statement	or answers the question. (2 pts each,
1) Choose the best Lewis structure for S A) :ö:	60 ₄ 2	1)
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;		
$\begin{bmatrix} \ddot{\mathbf{o}} \\ \vdots \ddot{\mathbf{o}} - \ddot{\mathbf{s}} - \ddot{\mathbf{o}} \\ \vdots \ddot{\mathbf{o}} - \ddot{\mathbf{s}} \end{bmatrix}^{2-}$ \mathbf{c}		
.;ö: .;ö: .;ö: .;ö: .;ö:		
$ \begin{bmatrix} \vdots \vdots \\ \vdots$		
$\begin{bmatrix} \vdots \circ \vdots \\ \vdots \circ \vdots \circ \vdots \\ \vdots \circ \vdots \circ \vdots \end{bmatrix}^{2-}$		
2) What is the maximum number of d orb	pitals that are possible?	
A) 9 B) 1	C) 7 D) 5	E) 3

4) Give the numbers for m_{ℓ} (magnetic quantum numbers) for $\ell=1$ (angular momentum quantum numbers) A) -2 , -1 , 0 , 1 , 2 , B) 0 , 1 , C) -1 , 0 , 1 , D) 1 , 2 5) Identify the shortest bond. A) single covalent bond B) double covalent bond C) triple covalent bond D) all of the above bonds are the same length 6) Which reaction below represents the first ionization of O ? A) $O(g) = O'(g) + e$ B) $O(g) + e' = O(g)$ C) $O(g) - O'(g) + e'$ B) $O(g) + e' - O'(g)$ E) $O(g) + e - O'(g)$ F) Identify the species that has the smallest radius. A) N^{-2} B) N^{0} C) N^{+3} D) N^{-5} E) N^{+1} 6) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) A cation of $+2$ indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) pescribe the shape of a p orbital. A) three balls B) dumbbel shaped C) spherical D) from bells E) eight balls E) eight balls	a given atom ?	are contained in	me mird princip	oal level ($n = 3$, princi	ipal quantum number) of	3)
A) -2, -1, 0, 1, 2 B) 0, 1 C) -1, 0, 1 D) 1, 2 5) Identify the shortest bond. A) single covalent bond B) double covalent bond C) triple covalent bond D) all of the above bonds are the same length 6) Which reaction below represents the first ionization of O? A) O(g) - O(g) + e B) O(g) + e - O(g) C) O(g) - O(g) + e D) O(g) + e - O(g) E) O(g) + e - O2(g) 7) Identify the species that has the smallest radius. A) N-2 B) NO C) N+3 D) N-5 E) N+1 6) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two protons. D) lost two protons. E) lost two neutrons. C) gained two protons. E) lost two neutrons. C) gained two protons. B) lost two neutrons. C) gained two neutrons. C) gained two neutrons. C) gained two neutrons. C) lost neutrons. C) lost neutrons. C)	A) 5	B) 9	C) 18	D) 3	E) 7	
A) -2, -1, 0, 1, 2 B) 0, 1 C) -1, 0, 1 D) 1, 2 5) Identify the shortest bond. A) single covalent bond B) double covalent bond C) triple covalent bond D) all of the above bonds are the same length 6) Which reaction below represents the first ionization of O? A) O(g) - O(g) + e B) O(g) + e - O(g) C) O(g) - O(g) + e D) O(g) + e - O(g) E) O(g) + e - O2(g) 7) Identify the species that has the smallest radius. A) N-2 B) NO C) N+3 D) N-5 E) N+1 6) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two protons. D) lost two protons. E) lost two neutrons. C) gained two protons. E) lost two neutrons. C) gained two protons. B) lost two neutrons. C) gained two neutrons. C) gained two neutrons. C) gained two neutrons. C) lost neutrons. C) lost neutrons. C)	4) Give the numbers for	or m_ℓ (magnetic q	uantum number	s) for $\ell = 1$ (angular i	momentum quantum	4)
5) Identify the shortest bond. A) single covalent bond B) double covalent bond C) triple covalent bond D) all of the above bonds are the same length 6) Which reaction below represents the first ionization of O? A) O(g) - O(g) + e B) O(g) + e - O(g) C) O(g) - O(g) + e D) O(g) + e - O(g) E) O(g) + e - O(g) T) Identify the species that has the smallest radius. A) N-2 B) N0 C) N+3 D) N-5 E) N+1 8) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	numbers)				•	,
A) single covalent bond B) double covalent bond C) triple covalent bond D) all of the above bonds are the same length 6) Which reaction below represents the first ionization of O? A) O(g) - O'(g) + e B) O'(g) + e - O(g) C) O'(g) + e - O(g) E) O'(g) + e - O ² (g) F) O(g) + e - O ² (g) F) O(g) + e - O ² (g) T) Identify the species that has the smallest radius. A) N-2 B) N ⁰ C) N+3 D) N-5 E) N+1 3) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two retons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	A) -2, -1, 0, 1, 2	B) 0, 1		C) -1, 0, 1	D) 1, 2	
A) single covalent bond B) double covalent bond C) triple covalent bond D) all of the above bonds are the same length 6) Which reaction below represents the first ionization of O? A) O(g) - O'(g) + e B) O'(g) + e - O(g) C) O'(g) + e - O(g) E) O'(g) + e - O ² (g) F) O(g) + e - O ² (g) F) O(g) + e - O ² (g) T) Identify the species that has the smallest radius. A) N-2 B) N ⁰ C) N+3 D) N-5 E) N+1 3) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two retons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	5) Identify the shortest	t bond.				
C) triple covalent bond D) all of the above bonds are the same length 6) Which reaction below represents the first ionization of O? A) O(g) - O'(g) + e B) O'(g) + e - O(g) C) O'(g) - O(g) + e D) O(g) + e - O2(g) E) O'(g) + e - O2(g) 7) Identify the species that has the smallest radius. A) N-2 B) NO C) N+3 D) N-5 E) N+1 8) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) agained two protons. C) gained two protons. C) gained two protons. E) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls						5)
D) all of the above bonds are the same length 6) Which reaction below represents the first ionization of O? A) O(g) — O'(g) + e* B) O'(g) + e* — O(g) C) O(g) + e*— O(g) E) O(g) + e*— O ² (g) 7) Identify the species that has the smallest radius. A) N-2 B) N ⁰ C) N+3 D) N-5 E) N+1 8) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A cation of +2 indicates that an element has A) gained two protons. C) gained two protons. C) gained two electrons. D) lost two protons. E) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls						
6) Which reaction below represents the first ionization of O? A) O(g) - O'(g) + e B) O'(g) + e - O(g) C) O(g) - O(g) + e D) O(g) + e - O2(g) E) O'(g) + e - O2(g) 7) Identify the species that has the smallest radius. A) N-2 B) N0 C) N+3 D) N-5 E) N+1 8) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two protons. E) lost two neutrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	C) triple covalent	bond				
A) O(g) - O(g) + e' B) O(g) + e' - O(g) C) O(g) - O(g) + e' D) O(g) + e' - O(g) E) O(g) + e' - O(g) E) O(g) + e' - O(g) E) O(g) + e' - O(g) T) Identify the species that has the smallest radius. A) N-2 B) N ⁰ C) N+3 D) N-5 E) N+1 8) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) Cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two electrons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls E) eight balls	D) all of the abov	e bonds are the sa	me length			
A) O(g) - O(g) + e' B) O(g) + e' - O(g) C) O(g) - O(g) + e' D) O(g) + e' - O(g) E) O(g) + e' - O(g) E) O(g) + e' - O(g) E) O(g) + e' - O(g) T) Identify the species that has the smallest radius. A) N-2 B) N ⁰ C) N+3 D) N-5 E) N+1 8) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) Cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two electrons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls E) eight balls						
B) O(g) + e - O(g) C) O(g) - O(g) + e D) O(g) + e - O(g) E) O(g) + e - O(g) E) O(g) + e - O(g) F) O(g) + e - O(g) E) O(g) + e - O(g) F) O(g) + e - O(g) E) O(g) + e - O(g) F) O(g) + O(g) + O(g)	o) which reaction belo	w represents the f	irst ionization o	f O?		6)
C) O(g) - O(g) + e ⁻ D) O(g) + e ⁻ O(g) E) O(g) + e ⁻ - O(g) E) O(g) + O(g) + O(g) + O(g) E) O(g) + O(g) + O(g) + O(g) + O(g) E) O(g) +	$A) O(g) \rightarrow O'(g) + B) O'(a) + a$	+ e* /- \				·/
D) O(g) + e - O'(g) E) O'(g) + e - O^2(g) 7) Identify the species that has the smallest radius. A) N-2 B) N0 C) N+3 D) N-5 E) N+1 8) 3) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) a cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two protons. B) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls E) eight balls	$D) O(g) + e \rightarrow O(g)$	(g)				
E) O'(g) + e' - O2'(g) 7) Identify the species that has the smallest radius. A) N'-2 B) N'0 C) N+3 D) N'-5 E) N+1 8)	$C) O(g) \rightarrow O(g) +$	- e- (-)				
7) Identify the species that has the smallest radius. A) N ⁻² B) N ⁰ C) N+3 D) N-5 E) N+1 8)						
A) N-2 B) N0 C) N+3 D) N-5 E) N+1 3) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	E) $O(g) + e^{c} \rightarrow O(g)$	²⁻ (g)				
A) N-2 B) N0 C) N+3 D) N-5 E) N+1 3) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	7) Identify the species t	hat has the sm -11.				
3) The distance between adjacent crests of a wave is called A) frequency B) area C) wavelength D) amplitude E) median A) A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls E) eight balls	ΔN_{i} = 2					7)
B) area C) wavelength D) amplitude E) median A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	A) IN -	B) No	C) N+3	D) N-5	E) N+1	-
B) area C) wavelength D) amplitude E) median A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	3) The distance between	n adiacont mosts	·			
B) area C) wavelength D) amplitude E) median A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	A) frequency	it aujacerii crests o	r a wave is calle	ed		8)
C) wavelength D) amplitude E) median A) a cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls						
D) amplitude E) median A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls						
E) median A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls						
A cation of +2 indicates that an element has A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls						
A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls						
A) gained two protons. B) lost two neutrons. C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls) A cation of +2 indicat	es that an elemen	t has			
C) gained two electrons. D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	A) gained two prot	tons.		•		9)
D) lost two protons. E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls						
E) lost two electrons. Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	C) gained two elect	trons.				
Describe the shape of a p orbital. A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	D) lost two protons	5.				
A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls	E) lost two electror	ns.				
A) three balls B) dumbbell shaped C) spherical D) four balls E) eight balls) Dogorika al- 1					
B) dumbbell shaped C) spherical D) four balls E) eight balls	A) there is 1	a p orbital.			•	10)
C) spherical D) four balls E) eight balls		1				10)
D) four balls E) eight balls		a				
E) eight balls						
	, -0-4 54113					
	Marine Sangara					
	• •					

11) Which of the follow A) C B) F C) Li D) Se	ing elements can fo	rm compounds	s with an expanded o	octet?	11)
E) All of the above	ve elements can forr	n compounds v	with an expanded oc	tet.	
12) How many differen principal level? A) 4				re possible in the third	12)
10) 7	ŕ	•	,	E) 2	
13) For $n = 3$ (principal quantum numbers)	quantum numbers), ?	what are the p	ossible values of &	(angular momentum	13)
A) 0, 1, 2	B) 0, 1	•	C) 0, 1, 2, 3	D) 0	

II.	Short Answers (41	pts)
-----	-----------------	----	------

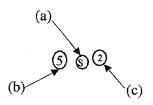
- 1. Matching: Match the following with the description by filling in the blank with one of the letters. Each letter can only be used ONE time. (9 pts total, 3 pts each)
 - (a) n, principal quantum number
 - (b) m_r, magnetic quantum number
 - (c) ℓ , angular momentum quantum number

determines the shape of the orbitals in the subshell, subshell, goes with the s block, p block d block or f block of the periodic table	ζ,
determines how far away from the nucleus the electron is located, also the shell or period number of the periodic table	

determines the orientation of the orbitals (example: x = x = y = y direction - $p_x = y = z = y$

2. Match the following by filling in the blank with one of the letters. Each letter may only be used ONE time (9 pts each, 3 pts each)

for the symbol $5s^2$

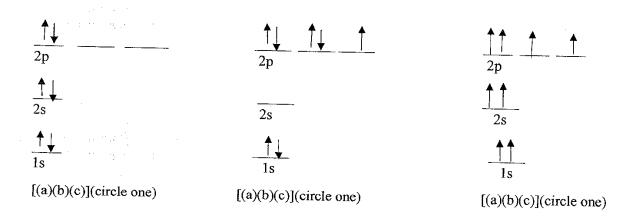


gives the subshell or shape of the orbitals in the subshell

gives principal quantum number of shell

gives the number of electrons in the designated subshell

- 3. Match the name of the electron configuration rule with the orbital diagram which shows a violation of the electron configuration rule by circling one of the letters under each electron orbital diagram. (9 pts total, 3 pts each)
- (a) Pauli Exclusion Principal
- (b) aufbau Principal
- (c) Hund's Rule



4. Which of the following shows a <u>covalent bonding</u> Lewis Dot Structure reaction for the formation of an <u>covalent bond</u>. Circle the letter of the correct reaction. (5 pts)

Reaction (a)
$$Csx + Br_{\bullet,\bullet} \rightarrow Cs \times Cl \times Br_{\bullet,\bullet} \rightarrow Cs \times Cs \times Br_{\bullet,\bullet} \rightarrow C$$

- 5. Periodic Trends: (9 pts total, 3 pts each letter)
- (a) Circle the element which has a <u>larger atomic radius</u> [(C) or (F)] (circle one)
- (b) Circle the element which has a <u>higher first ionization energy</u> [(C) or (F)] (circle one)
- (c) Circle the element which has <u>higher electronegativity</u> [(B) or (F)](circle one)

	III. Long Answer (34 pts) Please sho work, you will lose points.	ow work. If y	you get the fi	nal correct nu	mber without showing	; your
	1. For the element, <u>Br</u> (18 pts	total, 3 pts ea	ach letter)			
	(a) Give the <u>electron configuration</u>	of the eleme	ent above in t	he format, (1s	2 , $2s^{2}$, $2p^{6}$,)	
	(b) Give the <u>valence</u> electron config	guration of the	same eleme	nt in the forma	at. $(1s^2, 2s^2, 2p^6,)$	
((c) Give the <u>valence</u> electron config	uration of the	anion Br -1	in the format ($(1s^2, 2s^2, 2p^6, \ldots)$	
	Anterior Control anterior					
	(d) Give the <u>valence</u> electron configurated up and down arrows for the +1/2 and (<u>format</u> required: A D	i-1/2 electron	as		owing a line for an orbarily the answer)	oital
(e	e) How many valence electrons does	the element l	nave?			
(f)	f) Give the Lewis Dot symbol (Lewis	s dot structure	e) for the sam	e element by i	tself.	
	Dr. Hahn General Cher		Exam III		11/14/16	6

- 2. Complete the following about the same Lewis Dot structure. (16 pts total)
- (A) For the molecule below with the molecular formula (Cl N C2 O H4), give the total number of valence electrons in the entire molecule. Show work. (6 pts)

(C) For the Lewis Dot structure which you chose in part (B), explain why the one you <u>did not</u> choose is incorrect by <u>doing an electron count</u> and explain why you did not choose this Lewis Dot structure. (4 pts)

(D)	Give one other explanation of why the structure that you did not choose is incorrect. (2 pts)
	(2 pt)
E) :	For the Lewis Dot structure which and the
2 pt	For the Lewis Dot structure which you chose in part (A) above, draw one valid <u>resonance structure</u> (s)
	· · · · · · · · · · · · · · · · · · ·
	· · · · · · · · · · · · · · · · · · ·

General Chemistry I Lecture I	all 2016 11/14/16 M E	am III form	Pink Dr. H	ahn Exam#	·-·
Name	(<u></u>	rint) Name			(sign)
Please show work for partial cr choice questions have no partial continue on the empty back pa cannot read it, I obviously cannot (Please count your exam pages	ges but clearly label who grade it). Return vo	tere the remain	want graded ing answer c	legibly. If you run o an be found. (If I can	ut of space , please t find your answer or
MULTIPLE CHOICE. Choose 26 pts total)	the one alternative tha	t best complet	es the statem	ent or answers the q	uestion. (2 pts each,
1) Describe the shape of A) four balls B) three balls C) dumbbell shape D) eight balls E) spherical					1)
2) For $n=3$ (principal quantum numbers)?	antum numbers), what	are the possibl	e values of ℓ	(angular momentum	n 2)
A) 0, 1, 2	B) 0	C) 0, 1	ļ.	D) 0, 1, 2, 3	
3) The distance between A) wavelength B) frequency C) amplitude D) median E) area	adjacent crests of a wav	e is called			3)
4) Identify the species tha	it has the smallest radiu				
A) N ⁰		N-5	D) N-2	E) N+3	4)
5) How many orbitals are a given atom ?	contained in the third p	rincipal level (n = 3, princip	al quantum number)	of 5)
	B) 5 C)		D) 9	E) 18	
6) Which reaction below r A) O(g) + e - O (g) B) O'(g) + e - O(g) C) O(g) - O'(g) + e D) O'(g) - O(g) + e E) O (g) + e - O ² (g)		tion of O?			6)
 Give the numbers for m_i numbers) 	(magnetic quantum nu	mbers) for $\ell=1$. (angular mo	mentum quantum	7)
A) -2, -1, 0, 1, 2	B) 1, 2	C) -1, 0,	1	D) 0, 1	
Dr. Hahn General Che		am III j	Fall 2016	form Pink page	1

Andrews Andrews (1997)

8)	Which of the	following	g elements car	form com	pounds with	n an expanded (octet?
	ANGO		~ <u>.</u>			F	

9) _____

10)

- B) C
 - C) Li
 - D) F
 - E) All of the above elements can form compounds with an expanded octet.

9) A cation of +2 indicates that an element has

- A) lost two electrons.
- B) lost two neutrons.
- C) gained two protons.
- D) gained two electrons.
- E) lost two protons.

10) Choose the best Lewis structure for
$$SO_4^2$$
.

$$\begin{bmatrix} :\ddot{o}:\\ :\ddot{o}-\dot{s}-\ddot{o}:\\ :\dot{o}:\end{bmatrix}^2$$

E)

11) What is the maximum number of d orbitals that are possible?

10年14月5

- A) 7
- B) 3
- C) 9
- D) 1
- E) 5
- 11) ____

Dr. Hahn General Chemistry I Lecture Exam III

Fall 2016

12) How many different principal level? A) 3	values of ℓ (and B) 4	ngular momer C) 2	itum quan	tum number) are	possible in the third E) 0	12) _
13) Identify the shortest A) single covalent B) triple covalent C) double covalen D) all of the above	bond bond it bond	same length	:			13) _
,	outdo are the	same length	:			
		entenne den i problèm più diffe partici et plate.	:			
・ 大野東東東 1000円 ・ 大野東東東 1000円 ・ 大野東東東 1000円		er för ende fam det der de geste er Gröne med er entrette de de geste för				
						٠.

II.	Short Answers	(41	pts
***	DHOIT THIS WOLS	(TI	pus

- 1. Matching: Match the following with the description by filling in the blank with one of the letters. Each letter can only be used ONE time. (9 pts total, 3 pts each)
 - (a) ℓ , angular momentum quantum number
 - (b) n, principal quantum number
 - (c) m, magnetic quantum number

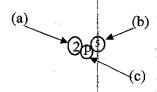
determines the orientation of the orbitals (example: x = x = y direction - $p_x = y = y$

determines how far away from the nucleus the electron is located, also the shell or period number of the periodic table

determines the shape of the orbitals in the subshell, subshell, goes with the s block, p block, d block or f block of the periodic table

2. Match the following by filling in the blank with one of the letters. Each letter may only be used ONE time (9 pts each, 3 pts each)

for the symbol 2p⁵



gives the number of electrons in the designated subshell

gives principal quantum number of shell

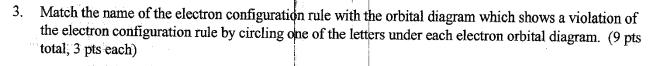
gives the subshell or shape of the orbitals in the subshell

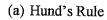
Dr. Hahn

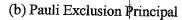
General Chemistry I

Exam III Pink

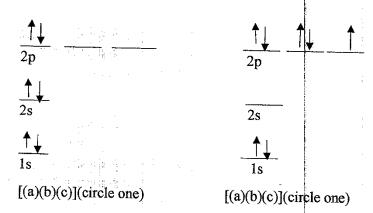
11/14/16

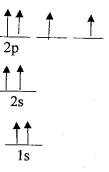






(c) aufbau Principal





[(a)(b)(c)](circle one)

4. Which of the following shows an <u>ionic bonding</u> Lewis Dot Structure reaction for the formation of an <u>ionic bond</u>. Circle the letter of the correct reaction. (5 pts)

Reaction (a)
$$Cs \times + Br \longrightarrow Cs \times Br \longrightarrow Cs \times Br \longrightarrow Cs \times Br \longrightarrow Cl \times Br \longrightarrow$$

- 5. Periodic Trends: (9 pts total, 3 pts each letter)
- (a) Circle the element which has a <u>larger atomic radius</u> [(C) or (Sn)] (circle one)
- (b) Circle the element which has a higher first ionization energy [(Sn) or (C)] (circle one)
- (c) Circle the element which has <u>higher electronegativity</u> [(F) or (I)] (circle one)

Dr. Hahn

General Chemistry 1

Exam III Pink

11/14/16

			100			
III. wor	Long Answer (34 pts) k, you will lose points.	Please show work.	If you get	the final correct num	ber without showi	ng your
	1. For the element, <u>Te</u>	(18 pts total,	3 pts each le	tter)		
(a)	Give the <u>electron con</u>	figuration of the e	lement abov	e in the format. (1s ²	$2s^2 2n^6$	
	1. 化聚氰酸 化氯化二甲基酚 (1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	-		, (15)	20,2p,)	

(b)	Give the <u>valence</u> elect	ron configuration d	of the same e	lement in the format	(1,2, 2,2, 2,6	`
				tement in the format	. (18, 28 ⁻ , 2p ⁻ ,)
-						
	and the second s					
(c)	Give the <u>valence</u> electr	ron configuration o	f the anion 1	e^{-2} in the format (1)	$1s^2, 2s^2, 2p^6,)$	
	e i na svoji o tolije. V					
		!				
(4)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
(d) and u	Give the <u>valence</u> electry p and down arrows for the	on configuration di	agram for th	e same element shov	ving a line for an o	orbital
(format required: 🛧 🔻	↑ 1/2 and -1/2 ele		rmat is not necessar	ily the energy	
	1s	2s 2p			ily the answer)	
	and the second s					
		•	:			
(e)	How many valence elect	Tons does the elam	ont have 9			
			om nave!			
(f)	Give the Lewis Dat and	val (f 1 · · ·				
	Give the Lewis Dot symb	on (Lewis dot struc	cture) for the	same element by its	elf.	
	Dr. Hahn	General Chemistry	1 (xam III Pink	11/14/16	6
	The state of the s		i.		, -	U

- 2. Complete the following about the same Lewis Dot structure. (16 pts total)
 - (A) For the molecule below with the molecular formula (Cl C₂ O H₃), give the total number of valence electrons in the entire molecule. Show work. (6 pts)

... ♥

(a)

- (b)
- (C) For the Lewis Dot structure which you chose in part (B), explain why the one you <u>did not</u> choose is incorrect by <u>doing an electron count</u> and explain why you did not choose this Lewis Dot structure. (4 pts)

Dr. Hahn

			į		
		H			
	(D) Give one other explanation	n of why the structure the	at you did not choose is in	acorrect. (2 pts)	
			:		
		Consideration of the constant			
	terrior (1997)				
	E) For the Lewis Dot structu 2 pts)	re which you chose in p	art (A) above, draw one v	alid <u>resonance structure</u>	
,	- pus;		:		
	1000000000000000000000000000000000000			·	
	er en	en e	:		
		12. 15. 200 days - 4	:		
		ALES COMPANY OF THE STATE OF TH	:		
			:		
		A contract of the contract of			
		All Care and All C			
		de antidade de la companya de la com			
	た。TOTA 様で食 a to in	25 mg/s			
		ALC IN SHIPLE			
	i de la companya de l	LANGERSON CO			
		A. Commission			
	and the state of the state of	is care constitution of the constitution of th		•	
	Dr. Hahn	General Chemistry I	Exam III Pink	11/14/16	3
		States the states			
			1 1		