

Fall 2011
CHEM 1110.40413
Test 2, Form A

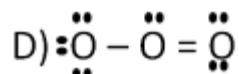
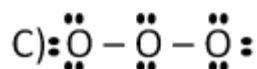
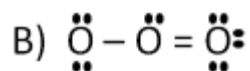
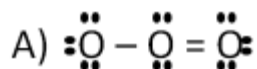
Name: _____

Part I. Multiple Choice: Clearly circle the best answer. (60 pts)

- An aluminum ion, Al^{3+} , has:
 - 27 protons and 24 electrons
 - 13 protons and 13 electrons
 - 13 protons and 10 electrons
 - 10 protons and 13 electrons
- The formula for sodium sulfide is
 - K_2S
 - Na_2S
 - NaS
 - NaS_2
- Which ion is *isoelectronic* with Ar?
 - Fe^{2+}
 - Ca^{2+}
 - Br^-
 - F^-
- The compound, P_4S_{10} , is used in the manufacture of safety matches. What is its name?
 - tetraphosphorus decasulfide
 - phosphoric sulfide
 - phosphorus decasulfide
 - phosphorus sulfide
- Select the element whose Lewis symbol is correct.
 - a. $\cdot\text{Ga}\cdot$
 - b. $\cdot\text{Al}\cdot$
 - c. $:\ddot{\text{Br}}\cdot$
 - d. $\cdot\ddot{\text{Tl}}\cdot$
- Consider the element with the electron configuration $[\text{Kr}] 5s^2 4d^{10} 5p^5$. This element is
 - an alkali metal.
 - a noble gas.
 - a transition metal.
 - a halogen.
- The elements in a column of the periodic table are known as
 - a group.
 - nonmetals.
 - a period.
 - metalloids.
- Tetrasulfur dinitride decomposes explosively when heated. What is its formula?
 - 4SN_2
 - S_2N_4
 - S_4N
 - S_4N_2

9. Which of these atoms is the *most* electronegative?
- A) Ge
B) P
C) As
D) Cs
10. Which is the correct formula for copper (II) phosphate?
- A) $\text{Cu}(\text{PO}_3)_2$
B) $\text{Cu}(\text{PO}_4)_2$
C) Cu_2PO_4
D) $\text{Cu}_3(\text{PO}_4)_2$
11. How many *valence electrons* does a tin (Sn) atom have?
- A) 50
B) 4
C) 36
D) 2
12. What is the formula for the ionic compound formed by calcium ions and nitrate ions?
- A) Ca_2NO_3
B) $\text{Ca}(\text{NO}_3)_2$
C) Ca_3N_2
D) CaNO_3

13. Which of these choices is a correct Lewis structure for ozone, O_3 ?



14. How many electrons are in a triple bond?
- A) 1
B) 6
C) 4
D) 2
15. Which of the following is the empirical formula for hexane, C_6H_{14} ?
- A) C_6H_{14}
B) $\text{C}_{12}\text{H}_{28}$
C) C_3H_7
D) $\text{CH}_{2.3}$

16. What is the name of $\text{Mn}(\text{CO}_3)_2$?
- manganese (II) carbonate
 - manganese (IV) carbonate
 - manganese carbide
 - magnesium (II) carbonate
17. Which two electron configurations represent elements that would have similar chemical properties?
- (1) $1s^2 2s^2 2p^4$ (2) $1s^2 2s^2 2p^5$ (3) $[\text{Ar}]4s^2 3d^{10} 4p^3$ (4) $[\text{Ar}]4s^2 3d^{10} 4p^4$
- (1) and (4)
 - (1) and (2)
 - (2) and (4)
 - (1) and (3)
18. Which of these compounds is most likely to be ionic?
- ICl
 - KF
 - CS_2
 - CO_2
19. Which of these atoms has the smallest radius?
- As
 - Te
 - P
 - Al
20. The formal charge on Cl in the structure shown for the perchlorate ion is
- $$\left[\begin{array}{c} \text{:}\ddot{\text{O}}\text{:} \\ | \\ \ddot{\text{O}}=\text{Cl}=\ddot{\text{O}} \\ | \\ \text{:}\ddot{\text{O}}\text{:} \end{array} \right]^-$$
- +1
 - 2
 - +2
 - 1
21. Iron (III) chloride hexahydrate is used as a coagulant for sewage and industrial wastes. What is its formula?
- $\text{Fe}_3\text{Cl}(\text{H}_2\text{O})_6$
 - $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$
 - $\text{Fe}_3\text{Cl} \cdot 6\text{H}_2\text{O}$
 - $\text{Fe}(\text{Cl} \cdot 6\text{H}_2\text{O})_3$
22. Which of these elements exhibits chemical behavior similar to that of oxygen?
- sulfur
 - magnesium
 - chlorine
 - sodium

23. Diiodine pentoxide is used as an oxidizing agent that converts carbon monoxide to carbon dioxide. What is its chemical formula?
- A) I_5O_2
 - B) $(IO_5)_2$
 - C) IO_5
 - D) I_2O_5
24. The formal charge on the sulfur atom in the resonance structure of sulfur dioxide which has one single bond and one double bond is
- A) -1
 - B) 0
 - C) +2
 - D) +1
25. Which of these pairs of elements would be most likely to form an ionic compound?
- A) Cl and I
 - B) C and S
 - C) Cl and Mg
 - D) Al and K
26. Arrange aluminum, nitrogen, phosphorus and indium in order of increasing electronegativity.
- A) $In < Al < P < N$
 - B) $In < P < Al < N$
 - C) $Al < In < P < N$
 - D) $Al < In < N < P$
27. Which of these choices is the electron configuration of the iron(III) ion?
- A) $[Ar] 4s^1 3d^5$
 - B) $[Ar] 4s^2 3d^3$
 - C) $[Ar] 4s^2 3d^9$
 - D) $[Ar] 3d^5$
28. Which element would be expected to have properties similar to arsenic?
- A) Sb
 - B) Pb
 - C) Sn
 - D) Se
29. The Lewis dot symbol consists of the symbol for the element surrounded by dot(s). What does the dot or dots represent?
- A) Electron configuration
 - B) Atomic number
 - C) Valence electrons
 - D) Core electrons
30. Which of these elements has the smallest first ionization energy?
- A) K
 - B) Cl
 - C) Na
 - D) Be

Part III. Lewis Structures: Draw the following molecules. Make sure you include any possible resonance structures. (15 pts)

a. PCl_3

b. XeF_4

c. SO_2

	IA																										VIIIA																																																																											
1	1	H 1.008																										2	He 4.00																																																																									
2	3	IIA																5	6	7	8	9	10																																																																															
	Li 6.94	Be 9.01															B 10.81	C 12.01	N 14.01	O 16.00	F 19.00	Ne 20.18																																																																																
3	11	12											13	14	15	16	17	18																																																																																				
	Na 22.99	Mg 24.31	IIIB	IVB	VB	VIB	VII B	VIII B			IB	IIB	Al 26.98	Si 28.09	P 30.97	S 32.06	Cl 35.45	Ar 39.95																																																																																				
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36																																																																																				
	K 39.10	Ca 40.08	Sc 44.96	Ti 47.90	V 50.94	Cr 52.00	Mn 54.94	Fe 55.85	Co 58.93	Ni 58.71	Cu 63.55	Zn 65.37	Ga 69.72	Ge 72.59	As 74.92	Se 78.96	Br 79.90	Kr 83.80																																																																																				
5	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54																																																																																				
	Rb 85.47	Sr 87.62	Y 88.91	Zr 91.22	Nb 92.91	Mo 95.94	Tc [98]	Ru 101.1	Rh 102.9	Pd 106.4	Ag 107.9	Cd 112.40	In 114.8	Sn 118.7	Sb 121.8	Te 127.60	I 126.90	Xe 131.30																																																																																				
6	55	56	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86																																																																																				
	Cs 132.9	Ba 137.3	Lu 175	Hf 178.5	Ta 181	W 183.9	Re 186.2	Os 190.2	Ir 192.2	Pt 195.1	Au 197	Hg 200.59	Tl 204.4	Pb 207.2	Bi 209	Po [209]	At [210]	Rn [222]																																																																																				
7	87	88	103	104	105	106	107	108	109	110	111	112	113	114	115	116		118																																																																																				
	Fr [223]	Ra [226]	Lr [262]	Rf [267]	Db [268]	Sg [271]	Bh [272]	Hs [270]	Mt [276]	Ds [281]	Rg [280]	Uub [285]	Uut [284]	Uuq [289]	Uup [288]	Uuh [293]		Uuo [294]																																																																																				
	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>57</td><td>58</td><td>59</td><td>60</td><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td> </tr> <tr> <td>La</td><td>Ce</td><td>Pr</td><td>Nd</td><td>Pm</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td> </tr> <tr> <td>138.9</td><td>140.1</td><td>140.9</td><td>144.2</td><td>[145]</td><td>150.4</td><td>152</td><td>157.3</td><td>158.9</td><td>162.5</td><td>164.93</td><td>167.3</td><td>168.9</td><td>173</td> </tr> <tr> <td>89</td><td>90</td><td>91</td><td>92</td><td>93</td><td>94</td><td>95</td><td>96</td><td>97</td><td>98</td><td>99</td><td>100</td><td>101</td><td>102</td> </tr> <tr> <td>Ac</td><td>Th</td><td>Pa</td><td>U</td><td>Np</td><td>Pu</td><td>Am</td><td>Cm</td><td>Bk</td><td>Cf</td><td>Es</td><td>Fm</td><td>Md</td><td>No</td> </tr> <tr> <td>[227]</td><td>232</td><td>[231]</td><td>238</td><td>[237]</td><td>[244]</td><td>[243]</td><td>[247]</td><td>[247]</td><td>[251]</td><td>[252]</td><td>[257]</td><td>[258]</td><td>[259]</td> </tr> </table>																		57	58	59	60	61	62	63	64	65	66	67	68	69	70	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	138.9	140.1	140.9	144.2	[145]	150.4	152	157.3	158.9	162.5	164.93	167.3	168.9	173	89	90	91	92	93	94	95	96	97	98	99	100	101	102	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	[227]	232	[231]	238	[237]	[244]	[243]	[247]	[247]	[251]	[252]	[257]	[258]	[259]
57	58	59	60	61	62	63	64	65	66	67	68	69	70																																																																																									
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb																																																																																									
138.9	140.1	140.9	144.2	[145]	150.4	152	157.3	158.9	162.5	164.93	167.3	168.9	173																																																																																									
89	90	91	92	93	94	95	96	97	98	99	100	101	102																																																																																									
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No																																																																																									
[227]	232	[231]	238	[237]	[244]	[243]	[247]	[247]	[251]	[252]	[257]	[258]	[259]																																																																																									