Exam 2A
Chem 1121
Fall 2018

Name: KEY

Show all work to receive credit.

Multiple Choice. [3 pts. each.] Select the *best* answer on the scantron sheet.

Q1. When sodium forms an ion, its charge is most likely to be:
A) 2–
B) 1–
C) 1+
D) 2+

Q2. The name given to the ion, S^{2-} is:
A) sulfate
B) sulfite
C) sulfide
D) sulfuric

Q3. The name given to the ion, Fe^{2+} is:
A) iron
B) ferrous
C) ferric
D) iron(I)

Q4. The formula for copper(II) carbonate is:
A) Cu_2CO_3
B) $CuCO_3$
C) $Cu(II)CO_3$
D) $Cu(CO_3)_2$

Q5. An atom with six valence electrons is likely to form an ion with a(n) _____ charge:
A) 6+
B) 1+
C) 1–
D) 2–

Q6. The number of electrons shared between two atoms in a double bond is:
A) 1
B) 2
C) 3
D) 4

Q7. The number of bonds that oxygen typically makes in molecules is:

A) 1
B) 2
C) 3
D) 4

Q8. The total number of valence electrons in the NO_3^- ion is:

A) 24
B) 22
C) 16
D) 4

Q9. The bond angle in a tetrahedral molecule is:

A) 109.5°
B) 90°
C) 120°
D) 180°

Q10. The most polar bond out of the series: C—C, C—N, C—O, and C—F is:

A) C—C
B) C—N
C) C—O
D) C—F

Q11. The molecular geometry of a molecule whose central atom has 3 bonds and 1 lone pair is:

A) trigonal planar
B) tetrahedral
C) trigonal pyramidal
D) linear

Short Response. Show your work (where appropriate) to receive full credit!

Q12. [10 pts] Write formulas for the following ionic compounds:

A) iron(II) chloride: $FeCl_2$

B) sodium carbonate: Na_2CO_3

C) cupric nitrate: $Cu(NO_3)_2$

D) ammonium sulfate: $(NH_4)_2SO_4$

E) aluminum phosphate: $AlPO_4$

10

Q15. [18 pts.] Predict the polarity of SF_2. Show ALL work. Be sure to include a valid Lewis structure, a sketch of the geometry using line/dash/wedge notation, write out the predicted bond-angle, and include the name of the molecular geometry. You should also clearly indicate how you determine the overall molecular polarity of the molecule.

Lewis:  (3)

VSEPR:  sketch (3)

≈109.5° (3)

BENT (3)

 (+3)

Bond dipoles.

overall dipole ≠ 0 ⇒ POLAR (+3)

18

Q16. [14 pts.] Balance the following chemical equations using the lowest whole-number coefficients:

A) 1 $C_7H_{16}(g)$ + 11 $O_2(g)$ → 7 $CO_2(g)$ + 8 $H_2O(g)$

B) 2 $LiN_3(s)$ → 2 $Li(s)$ + 3 $N_2(g)$

14

BONUS Question:
Which element is the chlorine-ion isoelectronic with? Argon. +3 pts.

13

32/35 bonus

Q13. [10 pts] Name the following compounds:

Hint: be sure to identify them as either ionic or molecular before naming!

A) KNO_2 potassium nitrite

B) N_2O_5 dinitrogen pentoxide

C) $CuSO_4$ copper(II) sulfate

D) P_3S_8 triphosphorus octasulfide

E) NH_3 ammonia

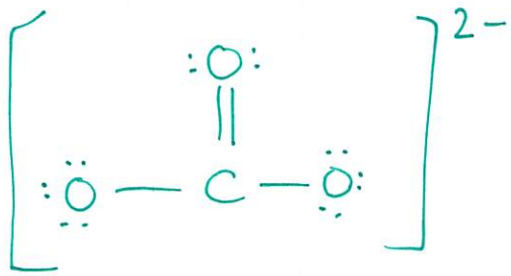
Q14. [15 pts.] Write valid Lewis structures for the following substances:

A) SF_2

20 e⁻

B) CO_3^{2-}

24 e⁻



C) CN^-

10 e⁻

Useful Information

Periodic Table of the Elements

IA	IIA											IIIA	IVA	VA	VIA	VIIA	VIIIA
1 H 1.00794																	2 He 4.002602
3 Li 6.941	4 Be 9.012182											5 B 10.811	6 C 12.0107	7 N 14.00674	8 O 15.9994	9 F 18.998403	10 Ne 20.1797
11 Na 22.989770	12 Mg 24.3050											13 Al 26.981538	14 Si 28.0855	15 P 30.973762	16 S 32.066	17 Cl 35.4527	18 Ar 39.948
19 K 39.0983	20 Ca 40.078	21 Sc 44.95591	22 Ti 47.867	23 V 50.9415	24 Cr 51.9961	25 Mn 54.938049	26 Fe 55.845	27 Co 58.9332	28 Ni 58.6934	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.92160	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.4678	38 Sr 87.62	39 Y 88.90585	40 Zr 91.224	41 Nb 92.90638	42 Mo 95.94	43 Tc [98]	44 Ru 101.07	45 Rh 102.9055	46 Pd 106.42	47 Ag 107.8682	48 Cd 112.411	49 In 114.818	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90447	54 Xe 131.29
55 Cs 132.90545	56 Ba* 137.327	71 Lu 174.967	72 Hf 178.49	73 Ta 180.9479	74 W 183.84	75 Re 186.207	76 Os 190.23	77 Ir 192.217	78 Pt 195.078	79 Au 196.96655	80 Hg 200.59	81 Tl 204.3833	82 Pb 207.2	83 Bi 208.98038	84 Po [210]	85 At [210]	86 Rn [222]
87 Fr [223]	88 Ra** [226]	103 Lr [262]	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [264]	108 Hs [265]	109 Mt [268]	110 [269]	111 [272]	112 [277]	113	114 [285]	115	116 [289]	117	118 [293]

*	57 La 138.9055	58 Ce 140.116	59 Pr 140.90765	60 Nd 144.24	61 Pm [145]	62 Sm 150.36	63 Eu 151.964	64 Gd 157.25	65 Tb 158.92534	66 Dy 162.50	67 Ho 164.93032	68 Er 167.26	69 Tm 168.93421	70 Yb 173.04
**	89 Ac [227]	90 Th 232.0381	91 Pa 231.03588	92 U 238.0289	93 Np [237]	94 Pu [244]	95 Am [243]	96 Cm [247]	97 Bk [247]	98 Cf [251]	99 Es [252]	100 Fm [257]	101 Md [258]	102 No [259]