Name: KEY

CHEM 1110.20787
Test 2, Form A
Spring 2013

	IA												IIIA	IVA	VA	VIA	VIIA	VIIIA
1	1 H 1.008	IIA																2 He 4.00
2	3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
3	11 Na 22.99	12 Mg 24.31	IIIB	IVB	VB	VIB	VIIB	VIIIB			IB	IIB	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
4	19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.71	29 Cu 63.55	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
5	37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc [98]	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.40	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.60	53 I 126.90	54 Xe 131.30
6	55 Cs 132.9	56 Ba 137.3	71 Lu 175	72 Hf 178.5	73 Ta 181	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197	80 Hg 200.59	81 Tl 204.4	82 Pb 207.2	83 Bi 209	84 Po [209]	85 At [210]	86 Rn [222]
7	87 Fr [223]	88 Ra [226]	103 Lr [262]	104 Rf [267]	105 Db [268]	106 Sg [271]	107 Bh [272]	108 Hs [270]	109 Mt [276]	110 Ds [281]	111 Rg [280]	112 Uub [285]	113 Uut [284]	114 Uuq [289]	115 Uup [288]	116 Uuh [293]		118 Uuo [294]

57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm [145]	62 Sm 150.4	63 Eu 152	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.93	68 Er 167.3	69 Tm 168.9	70 Yb 173
89 Ac [227]	90 Th 232	91 Pa [231]	92 U 238	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]

Part 1 – Naming/Formulas (40 pts)

1. (20 pts) Name the following compounds:

   a. $Ba_3(PO_4)_2$ barium phosphate

   b. Na_2O sodium oxide

   c. SCl_3 sulfur trichloride

   d. $Fe(C_2H_3O_2)_3$ iron(III) acetate

   e. OF_2 oxygen difluoride

   f. ArF_5 argon pentafluoride

   g. KBr potassium bromide

   h. Cr_2S_3 chromium(III) sulfide

   i. LiOH lithium hydroxide

   j. N_2O_5 dinitrogen pentoxide

2. (20 pts) Give the chemical formula for each of the following compounds

   a. Zinc(II) chromate
   $ZnCrO_4$

   b. Disulfur dichloride
   S_2Cl_2

   c. Nitrogen trioxide
   NO_3

   d. Ammonium fluoride
   NH_4F

   e. Magnesium hydroxide
   $Mg(OH)_2$

   f. Sodium carbonate
   Na_2CO_3

   g. Cobalt(II) chloride
   $CoCl_2$

   h. Dichlorine monoxide
   Cl_2O

   i. Sulfur hexafluoride
   SF_6

   j. Carbon dioxide
   CO_2

Part 2 – Quantum numbers, electron configurations, periodic trends (20 pts)

1. (5 pts) Write all the possible quantum numbers for n = 3.

n	l	m_l	m_s
3	2	-2, -1, 0, 1, 2	$\pm 1/2$
	1	-1, 0, 1	
	0	0	

2. (10 pts) Write the noble gas electron configuration for the following atoms and ions. Identify if they are paramagnetic or diamagnetic by circling the correct choice.

		Noble Gas Configuration	Para or Diamagnetic
a.	Cl	$[Ne]\,3s^2\,3p^5$	(P) or D
b.	Cr	$[Ar]\,4s^1\,3d^5$	(P) or D
c.	Cs	$[Xe]\,6s^1$	(P) or D
d.	Se^{2-}	$[Ar]\,4s^2\,3d^{10}\,4p^6$	P or (D)
e.	Mn^{2+}	$[Ar]\,3d^5$	(P) or D

3. (3 pts) Rank the following in order of increasing ionization energy: Si, C, S, F and Ca.

$Ca < Si < S < C < F$

4. (2 pts) Rank the following in order of increasing atomic radii: F, S, and N.

$F < N < S$

Part 3 – Calculations (30 pts), show ALL work for credit.

1. (10 pts) What is the energy of light that has a frequency of $5.15 \times 10^{+14}\ s^{-1}$?

$$E = h\nu = (6.626 \times 10^{-34}\ J \cdot s)(5.15 \times 10^{+14}\ s^{-1})$$

$$\boxed{E = 3.41 \times 10^{-19}\ J}$$

2. (5 pts) What is the molecular formula of a compound that has an molar mass of 176.4 g/mol and an empirical formula of C_3H_8.

C_3H_8 $3(12.01) + 8(1.008) = 44.09\ g/mol$

$$\frac{176.4\ g/mol}{44.09\ g/mol} = 4$$

$\boxed{C_{12}H_{32}}$

3. (15 pts) Acetylsalicylic acid, $C_9H_8O_4$, is the active ingredient in aspirin.
   a. Calculate the molar mass of $C_9H_8O_4$.

$$9C = 9(12.01\ g/mol) = 108.09\ g/mol$$
$$8H = 8(1.008\ g/mol) = 8.064\ g/mol$$
$$4O = 4(16.00\ g/mol) = 64.00\ g/mol$$
$$180.15\ g/mol$$

   b. Calculate the percent of oxygen in $C_9H_8O_4$.

$$\%O = \frac{64.00\ g/mol}{180.15\ g/mol} \times 100 = 35.53\%$$

   c. One aspirin tablet can contain 0.250g of $C_9H_8O_4$. How many molecules is this?

$$0.250\ g\ C_9H_8O_4 \times \frac{1\ mol\ C_9H_8O_4}{180.15\ g\ C_9H_8O_4} \times \frac{6.022 \times 10^{23}\ molecules\ C_9H_8O_4}{1\ mol}$$
$$= 8.36 \times 10^{20}\ molecules\ C_9H_8O_4$$

Part 4 – Short Answer (10 pts), please print legibly.

1. In an atom, valence electrons participate in bonding and chemical reactions, but core electrons shield the nucleus.

2. Metals tend to form cation and nonmetals tend to form anions which attract to form ionic compounds.

3. A compound that holds a specific number of water molecules within its solid structure is called a(n) hydrate.

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