NAME: KEY

Lab Section: __1(TuTh@3) __2(TuTh@9) __3(MW@1)

CHM 101 | Fall 2007

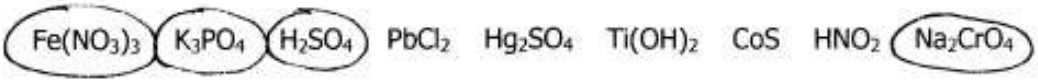
20 points, 30 mins. | **Basic Competency Quiz #5** | week 7

Chemistry, 7th ed., Zumdahl & Zumdahl, sections 4.1-4.7

Wallace | *revised 10/30/2007*

Unless otherwise specified, each question is worth 4 points.

1. Which of the following would be strong electrolytes in water? (circle your answers)



2. Calculate the molarity of 1.00 gram of NaCl dissolved in enough water to make 250.00 mL of solution.

$$1.00\,g \times \frac{1\,mol\,NaCl}{58.44\,g} = 0.0171\,mol\,NaCl$$

$$\frac{0.0171\,mol}{0.25000\,L} = \boxed{0.0684\,\frac{mol}{L}}$$

3. Identify each of the following as precipitation (P), acid-base (A-B) or oxidation-reduction (O-R) reactions:

a. $CH_3NH_{2(aq)} + HCl_{(aq)} \rightarrow CH_3NH_3Cl_{(aq)}$ ..... A-B

b. $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$ ..... O-R

c. $2H_2O_{2(aq)} \rightarrow 2H_2O_{(liq)} + O_{2(g)}$ ..... O-R

d. $Ca^{2+}_{(aq)} + CO_{2(g)} + H_2O_{(liq)} \rightarrow CaCO_{3(s)} + 2H^+_{(aq)}$ ..... P

4. For the reaction of calcium nitrate and ammonium sulfate, write the (a) overall or "formula" or "molecular" equation, (b) the complete ionic equation, (c) and the net ionic equation.

(a) $Ca(NO_3)_{2(aq)} + (NH_4)_2SO_{4(aq)} \rightarrow CaSO_{4(s)} + 2\,NH_4NO_{3(aq)}$

(b) $Ca^{2+} + 2NO_3^- + 2NH_4^+ + SO_4^{2-} \rightarrow CaSO_{4(s)} + 2NH_4^+ + 2NO_3^-$

(c) $Ca^{2+} + SO_4^{2-} \rightarrow CaSO_{4(s)}$

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5. When 50.0 mL of 0.0100 *M* $AgNO_3$ and 50.0 mL of 0.0150 *M* K_2CO_3 are mixed
   a. What is the formula for the precipitate that forms? (*1 point*)
   b. What is the mass of the precipitate that forms? (*3 points*)

(0) $2\ AgNO_3(aq) + K_2CO_3(aq) \rightarrow Ag_2CO_3(s) + 2\ KNO_3(aq)$

$AgNO_3$

(1) $0.0500\ L \times 0.0100\ \frac{mol}{L}$

$= 0.000500\ mol\ AgNO_3$

(2) $\times \frac{1\ mol\ Ag_2CO_3}{2\ mol\ AgNO_3}$

$= 0.000250\ mol\ Ag_2CO_3$

(LIMITING CASE)

(3) $0.000250\ mol\ Ag_2CO_3 \times \frac{275.81\ g}{mol\ Ag_2CO_3}$

$= \boxed{0.0690\ g\ Ag_2CO_3(s)}$

K_2CO_3

(1) $0.0500\ L \times 0.0150\ \frac{mol}{L}$

$= 0.000750\ mol\ K_2CO_3$

(2) $\times \frac{1\ mol\ Ag_2NO_3}{1\ mol\ K_2CO_3}$

$= 0.000750\ mol\ Ag_2NO_3$

(3) (N/A)

Abbreviated **Periodic Table of the Elements**

1 1A																	18 8A
1 H 1.008	2 2A											13 3A	14 4A	15 5A	16 6A	17 7A	2 He 4.00
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
11 Na 22.99	12 Mg 24.31	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
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 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La* 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226	89 Ac** (227)	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Uun	111 Uuu	112 Uub						

Water Solubility Rules (ref. Table 4.1, p. 144, *Chemistry, seventh edition*, Zumdahl & Zumdahl)

Note that there may be a number of exceptions to these rules, and/or there are more subtle classifications ("partially soluble", "somewhat soluble", "marginally soluble", etc.), but these are the rules that we will use in CHM 101.

1. (*Required memorization*)
2. (*Required memorization*)

3. Most chloride, bromide, and iodide salts are soluble. EXCEPTIONS (for CHM 101): chloride, bromide, and iodide salts containing Ag^+, Pb^{2+}, and Hg_2^{2+} are INSOLUBLE.
4. Most sulfate salts are soluble. EXCEPTIONS (for CHM 101): $BaSO_4$, $PbSO_4$, Hg_2SO_4, and $CaSO_4$, are INSOLUBLE.

5. Most hydroxide salts are insoluble, unless rule #2 applies to the compound.
6. Most sulfide (S^{2-}), carbonate (CO_3^{2-}), chromate (CrO_4^{2-}), and phosphate (PO_4^{3-}) salts are insoluble, unless rule #2 applies to the compound.