CHEMISTRY 101
SECOND EXAM (132)

Name:_____ **Date: 1/5/2014**

Student no. _____ **Section:**_____

Useful Information: *Gas Constant R= 0.08206 L.atm/K.mol, Specific heat of H_2O=4.18 J/g. °C Planck's Constant = 6.63 x $10^{-3\,4}$ J.s.*

H[1] 1.000																**He**[2] 4
Li[3] 6.941	**Be**[4] 9.012											**B**[5] 10.81	**C**[6] 12.01	**N**[7] 14.01	**O**[8] 16	**F**[9] 19	**Ne**[10] 20.18
Na[11] 22.99	**Mg**[12] 24.31											**Al**[13] 26.98	**Si**[14] 28.09	**P**[15] 30.97	**S**[16] 32.06	**Cl**[17] 35.45	**Ar**[18] 39.95
K[19] 39.10	**Ca**[20] 40.08	**Sc**[21] 44.96	**Ti**[22] 47.9	**V**[23] 50.94	**Cr**[24] 51.99	**Mn**[25] 54.94	**Fe**[26] 55.85	**Co**[27] 58.93	**Ni**[28] 58.71	**Cu**[29] 63.54	**Zn**[30] 65.37	**Ga**[31] 69.72	**Ge**[32] 72.59	**As**[33] 74.92	**Se**[34] 78.96	**Br**[35] 79.9	**Kr**[36] 83.8
Rb[37] 85.47	**Sr**[38] 87.62	**Y**[39] 88.91	**Zr**[40] 91.22	**Nb**[41] 92.91	**Mo**[42] 95.94	**Tc**[43] 99.91	**Ru**[44] 101.1	**Rh**[45] 102.91	**Pd**[46] 106.4	**Ag**[47] 107.87	**Cd**[48] 112.4	**In**[49] 114.8	**Sn**[50] 118.69	**Sb**[51] 121.75	**Te**[52] 127.6	**I**[53] 126.9	**Xe**[54] 131.3
Cs[55] 132.9	**Ba**[56] 137.3	**57-71** *	**Hf**[72] 178.5	**Ta**[73] 180.9	**W**[74] 183.85	**Re**[75] 186.2	**Os**[76] 190.2	**Ir**[77] 192.2	**Pt**[78] 195.1	**Au**[79] 196.97	**Hg**[80] 200.6	**Tl**[81] 204.37	**Pb**[82] 207.2	**Bi**[83] 208.98	**Po**[84] 210	**At**[85] 210	**Rn**[86] 222

Write the best fit answer of the following questions in this table:

Q1 (1.5 pt)	**Q2 (1 pt)**	**Q3 (1 pt)**	**Q4 (1 pt)**	**Q5 (1 pt)**	**Q6 (1 pt)**	**Q7 (1.5 pt)**	**Q8 (1 pt)**
Q9 (1 pt)	**Q10 (1 pt)**	**Q11 (1 pt)**	**Q12 (1 pt)**	**Q13 (1pt)**	**Total (13)**		

1. Write the ***IONIC*** and the ***NET IONIC*** equations for the following molecular equation: *(Hint: NH_4OH is weak base)*

$$NH_4OH_{(aq)} + H_3PO_{4(aq)} \rightarrow (NH_4)_3PO_4(aq) + 3\ H_2O(l)$$

Ionic:.....

Net Ionic:……..

2. If 40 mL of (0.1M) HCl solution were needed to neutralize 0.117 g of unknown ***dihydroxide*** base. What is the formula of this base?

a) $Ba(OH)_2$ b) $Be(OH)_2$ c) $Mg(OH)_2$ d) $Ca(OH)_2$

3. Given the following ***Redox*** reaction:

$$2\ NaI + Br_2 \longrightarrow 2\ NaBr + I_2$$

a) The Oxidizing agent is……...
b) The species which oxidized is……
c) Write the reduction half equation……..
d) The number of electrons lost or gained is……..

4. A 0.1 M solution of $AgNO_3$ was prepared by dissolving 500 mg of solid $AgNO_3$ in a certain volume of water. Calculate the volume (mL) of this solution:

a) 0.0294 mL b) 34.0 mL c) 294.0 mL d) 29.4 mL

5. Calculate ΔH for the reaction:

$$FeO(s) + CO(g) \longrightarrow Fe\ (s) + CO_2(g)$$

Given the following reactions and their respective enthalpy changes:

	ΔH/kJ
$Fe_2O_3(s) + 3\ CO(g) \longrightarrow 2\ Fe\ (s) + 3\ CO_2(g)$	- 23
$3\ Fe_2O_3(s) + CO(g) \longrightarrow 2\ Fe_3O_4\ (s) + CO_2(g)$	- 39
$Fe_3O_4(s) + CO(g) \longrightarrow 3\ FeO\ (s) + CO_2(g)$	+18

a) -11 kJ b) 11 kJ c) 12 kJ d) -1 kJ

6. An experiment requires the preparation of a water bath at 37 ºC. the temperature of cold tap water is 22 ºC, and hot tap water is 55 ºC. a student starts with 90.0 g of cold water, what mass of hot water must be added to reach 37 ºC:

a) 7.5 g b) 75 g c) 313.5 g d) 25.5 g

7. Answer the following questions:

a) If 5 mL of 18 M H_2SO_4 were diluted by adding 100 mL of water, the concentration of the diluted solution is……...
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……
……

b) The volume (L) occupied by 0.234 g of NH_3 gas at 30 ºC and a pressure of 0.85 *atm* is……
……
……
……

c) The electron configuration of Au is…….....
……

8. An electron transferred from the third energy level to another energy level. If the frequency of the radiation emitted due to this process is 2.92 x 10^{17} s^{-1}. What is the final energy level:

a) 2 b) 5 c) 3 d) 1

9. A 28.6 g sample of sodium carbonate decahydrate, $Na_2CO_3.10H_2O$ was heated to derive the water off according to the following equation:

$$Na_2CO_3.10H_2O(s) \longrightarrow Na_2CO_3(s) + 10\ H_2O(g)$$

If the pressure of the water vapor produced was 2.0 x10^3 kPa. Calculate the volume of water vapor at 100 ºC:

a) 15.3 mL b) 1552.1 mL c) 4.1 mL d) 416.2 mL

10. An excess Sodium Iodide solution, NaI(aq) was reacted with Lead Nitrate solution, $Pb(NO_3)_2(aq)$ to produce 200 mL of 0.2 M Sodium Nitrate solution, $NaNO_3(aq)$ according to the following equation:

$$\boldsymbol{Pb(NO_3)_2(aq) + 2\ NaI(aq) \longrightarrow 2\ NaNO_3(aq) + PbI_2(s)}$$

If the volume of NaI was 150 mL, calculate the concentration of $Pb(NO_3)_2(aq)$ solution:

a) 0.8 M b) 0.13 M c) 0.26 M d) 0.4 M

11. A sample of methane gas that has a volume of 3.8 L at 5 ºC was heated to 86 ºC at constant pressure. Calculate its new volume (L):

a) 2.94 b) 65.4 c) 4.91 d) 0.22

12. Consider the flask diagramed below. What is the total pressure (in atm) after the stopcock between the two flasks is opened at 23 ºC:

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13. Calculate the amount of heat released (ΔH^o_{Rxn}) from the combustion of ***1.0 g*** of CH_3OH according to the following equation:

$$2\ CH_3OH_{(l)} + 3\ O_{2(g)} \rightarrow 2\ CO_{2(g)} + 4\ H_2O_{(l)}$$

Given the following standard enthalpies of formation:

ΔH^o_f of $CO_2(g)$ = -394 KJ/mol,

ΔH^o_f of H_2O (l) = -286 KJ/mol,

ΔH^o_f of CH_3OH (l) = -239KJ/mol

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-GOOD LUCK-