CHEMISTRY 101
SECOND EXAM

Name:_____ **Date: 29/04/2012**

Student no. _____ **Section:**_____

Useful Information: *Gas Constant R= 0.08206 L.atm/K.mol*

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	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Q9	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**	**Q15**	**Q16**

1. Calculate the volume of water that must be added to 500 mL of 0.125 M HCl solution in order to dilute it to exactly 0.100 M.

a. 100 mL b. 125 mL c. 250 mL d. 625 mL

2. 25 mL of 0.10 M $AgNO_3$ solution were mixed with 10 mL of 0.10 M K_3PO_4 solution. Calculate the mass of Ag_3PO_4 precipitate formed according to the following equation:

$$3\ AgNO_{3(aq)} + K_3PO_{4(aq)} \rightarrow Ag_3PO_{4(s)} + 3\ KNO_{3(aq)}$$

a. 0.35 g b. 0.42 g c. 0.77 g d. 1.05

3. 45.0 mL of an aqueous solution of HNO_3 were needed to neutralize 0.456 g of $Mg(OH)_2$. Calculate the molarity of the HNO_3 solution.

a. 0.17 M b. 0.35 M c. 0.70 M d. 0.91 M

4. Calculate ΔH for the reaction:

$$\boldsymbol{2C_{(s)} + H_{2(g)} \longrightarrow C_2H_{2(g)}}$$

Given the following reactions and their respective enthalpy changes:

	ΔH/kJ
$C_2H_{2(g)} + 5/2O_{2(g)} \longrightarrow 2CO_{2(g)} + H_2O_{(l)}$	-1299
$C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$	-393
$H_{2(g)} + 1/2O_{2(g)} \longrightarrow H_2O_{(g)}$	-245
$H_2O_{(l)} \longrightarrow H_2O_{(g)}$	+40

a. 228 kJ b. 268 kJ c. 621 kJ d. 661 kJ

5. If 6.5 g of $NaOH_{(s)}$ dissolves in 100 g H_2O in a coffee-cup calorimeter, the temperature rises from 21.6°C to 37.8°C. ΔH (in **kJ/mol** NaOH) for this process is:
(Assume specific heat of solution is equal to the specific heat of water = 4.18 J/g°C, and that the coffee-cup doesn't gain heat)

a. 7.2 b. 44.4 c. 4.2 d. 16.2

6. A gas expands from 152 L to 189 L at a constant external pressure of 2 atm. It absorbs thereby 5000 J of heat. Calculate the change in the internal energy of the gas.

a. -2498 J b. +4926 J c. -4926 J d. +2498 J

7. The density of CH_4 (g) at 20°C and 2 atm is:

a. 0.67 g/L b. 1.0 g/L c. 1.34 g/L d. 16 g/L

8. A vessel with a volume of 10.0 L contains 2.80 g of N_2 gas, 0.403 g of H_2 gas and 79.9 g of Ar gas. What is the pressure in the vessel at 25ºC?

a. 0.471 atm b. 6.43 atm c. 3.20 atm. d. 5.62 atm

9. Given the equation: $\boldsymbol{S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}}$ $\boldsymbol{\Delta H=-296\ kJ}$;
Which of the following statement(s) is (are) true?

I. The reaction is exothermic.

II. When 0.50 mol $S_{(s)}$ is reacted, 148 kJ of energy is released.

III. When 32.0 g of $S_{(s)}$ are burned, 2.96×10^5 J of energy is released.

a. All are true. **b.** None is true.

c. I and II are true. **d.** Only I is true.

10. Calcium hydride (CaH_2) combines with water according to the following equation:

$$\boldsymbol{CaH_{2(s)} + 2H_2O_{(l)} \longrightarrow 2H_{2(g)} + Ca(OH)_{2(s)}}$$

Beginning with 84 g of $CaH_{2(s)}$ and enough water, what volume of H_2 will be produced at 273 K and a pressure of 1520 torr?

a. 22.4 L b. 44.8 L c. 89.6 L d. 179 L

11. The oxidizing agent in the reaction:

$$\boldsymbol{NO_3^- + I^- \rightarrow IO_3^- + NO_2}$$

a. NO_3^- b. I^- c. IO_3^- d. NO_2

12. Given that the density of 10.0% aqueous NaCl is 1.071 g/cm^3, what is the molar concentrations of Na^+ and Cl^-?

a. 1.83 mol/L b. 18.3 mol/L c. 0.0183 mol/L d. 62.7 mol/L

13. What volume of 2.00 M $Pb(NO_3)_2$ contains 600 mg of lead?

a. 145 ml b. 2.9 ml c. 1.45 ml d. 2900 ml

14. Chlorine gas is evolved at the anode of a commercial electrolysis cell at the rate of 3.65 L/min, at a temperature of 647°C. On its way to the intake pump it is cooled to 63°C. Calculate the rate of intake to the pump assuming the pressure has remained constant.

a. 355 L/min b. 0.355 L/min c. 1.33 L/min d. 1330 L/ min

15. The enthalpy of combustion of acetylene gas, $C_2H_2(g)$, at 25°C is -1299.58 kJ/mol
Determine the enthalpy of formation of acetylene. Given that ΔH_f of CO_2 is -393.51 KJ/mol and for H_2O is -285.83 KJ/mol.

a. -226.73 KJ/mol b. 2371 KJ/mol c. 226.73 KJ/mol d. -2371 KJ/mol

16.A certain hydrate has a formula of $MgSO_4.XH_2O$ a sample of 54.2 g of the compound is heated to drive the water off. I f the steam generated exerts a pressure of 24.8 atm in 2.00 L container at 120 °C calculate x.

a. 4 b. 5 c. 6 d. 7

-GOOD LUCK-