CHEMISTRY 101
SECOND EXAM (131)

Name:_____   Date: 16/12/2013

Student no. _____   Section:_____

Useful Information: *Gas Constant R= 0.08206 L.atm/K.mol, Specific heat of H_2O=4.18 J/g. °C*

H¹ 1.000																	He² 4
Li³ 6.941	Be⁴ 9.012											B⁵ 10.81	C⁶ 12.01	N⁷ 14.01	O⁸ 16	F⁹ 19	Ne¹⁰ 20.18
Na¹¹ 22.99	Mg¹² 24.31											Al¹³ 26.98	Si¹⁴ 28.09	P¹⁵ 30.97	S¹⁶ 32.06	Cl¹⁷ 35.45	Ar¹⁸ 39.95
K¹⁹ 39.10	Ca²⁰ 40.08	Sc²¹ 44.96	Ti²² 47.9	V²³ 50.94	Cr²⁴ 51.99	Mn²⁵ 54.94	Fe²⁶ 55.85	Co²⁷ 58.93	Ni²⁸ 58.71	Cu²⁹ 63.54	Zn³⁰ 65.37	Ga³¹ 69.72	Ge³² 72.59	As³³ 74.92	Se³⁴ 78.96	Br³⁵ 79.9	Kr³⁶ 83.8
Rb³⁷ 85.47	Sr³⁸ 87.62	Y³⁹ 88.91	Zr⁴⁰ 91.22	Nb⁴¹ 92.91	Mo⁴² 95.94	Tc⁴³ 99.91	Ru⁴⁴ 101.1	Rh⁴⁵ 102.91	Pd⁴⁶ 106.4	Ag⁴⁷ 107.87	Cd⁴⁸ 112.4	In⁴⁹ 114.8	Sn⁵⁰ 118.69	Sb⁵¹ 121.75	Te⁵² 127.6	I⁵³ 126.9	Xe⁵⁴ 131.3
Cs⁵⁵ 132.9	Ba⁵⁶ 137.3	57-71 *	Hf⁷² 178.5	Ta⁷³ 180.9	W⁷⁴ 183.85	Re⁷⁵ 186.2	Os⁷⁶ 190.2	Ir⁷⁷ 192.2	Pt⁷⁸ 195.1	Au⁷⁹ 196.97	Hg⁸⁰ 200.6	Tl⁸¹ 204.37	Pb⁸² 207.2	Bi⁸³ 208.98	Po⁸⁴ 210	At⁸⁵ 210	Rn⁸⁶ 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**	**Total (13)**	

1) Consider the following ***Unbalanced*** equations:

   (1) $NH_3 + NO_2 \longrightarrow N_2 + H_2O$
   (2) $HNO_3 + S \longrightarrow NO + SO_2 + H_2O$
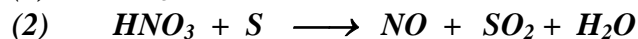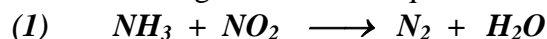
   Nitrogewn is acting as:
   a) Oxidizing agent in both equations.
   b) Reducing agent in both equations.
   c) Reducing agent in equation (1) and oxidizing agent in equation (2).
   d) Reducing agent in equation (2) and oxidizing agent in equation (1).

2) An experiment calls for 0.0353 g of potassium hydroxide, KOH. How many milliliters of (0.0176 M) KOH are required:

   a) 35.8 mL   b) 0.0358 mL   c) 120.6 mL   d) 71.6 mL

3) Complete and balance the following molecular reaction then write the ***IONIC*** and the ***NET IONIC*** equations:

   $CH_3COOH_{(aq)} + Ca(OH)_{2(aq)} \rightarrow$………………………………………………………….

   Ionic:...

   Net Ionic:…………………………………………………………………………………………..

4) Hydrochloric acid (75.0 mL of 0.25 M) is added to 225.0 mL of 0.0550 M $Ba(OH)_2$ solution. What is the concentration of HCl or $Ba(OH)_2$ left in this solution:

   a) 0.02 M   b) 0.00938 M   c) 0.01 M   d) 0.005 M

5) A sample of methane gas, CH_4, has the volume of 35.5 mL. This sample was produced at 31 °C and 753 torr. What is the volume of this sample at STP?

   a) 31.6 mL   b) 0.032 mL   c) 2.4 x 10^4 mL   d) 39.2 mL

6) A certain volume of concentrated H_2SO_4 (18 M) was diluted by adding 100 mL of water to give a solution of 7.0 M H_2SO_4. The final volume of the solution will be:

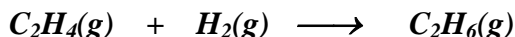   a) 200.30 mL   b) 63.64 mL   c) 36.80 mL   d) 163.64 mL

7) Air bags in cars are inflate by nitrogen gas, $N_2(g)$, which is generated according to the following equation:
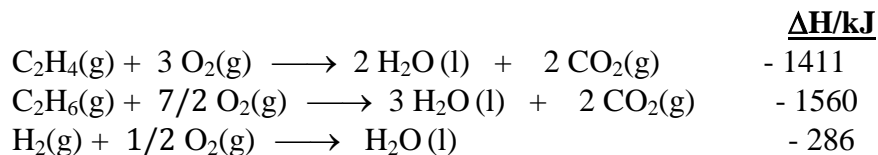
$$6\ NaN_3(s) + Fe_2O_3(s) \longrightarrow 9\ N_2(g) + 3\ Na_2O(s) + 2\ Fe(s)$$
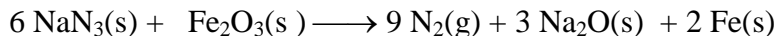
How many grames of sodium azide, NaN_3 would be required to provide 75.0 L of Nitrogen gas, N_2, at 25 °C and 748 mmHg:

a) 130.9 g   b) 3.0 g   c) 292.0 g   d) 14.3 g

8) Calculate ΔH for the reaction:

$$C_2H_4(g) + H_2(g) \longrightarrow C_2H_6(g)$$

Given the following reactions and their respective enthalpy changes:

	ΔH/kJ
$C_2H_4(g) + 3\ O_2(g) \longrightarrow 2\ H_2O\ (l) + 2\ CO_2(g)$	- 1411
$C_2H_6(g) + 7/2\ O_2(g) \longrightarrow 3\ H_2O\ (l) + 2\ CO_2(g)$	- 1560
$H_2(g) + 1/2\ O_2(g) \longrightarrow H_2O\ (l)$	- 286

a) 3257 kJ   b) 435 kJ   c) - 435 kJ   d) - 137 kJ

9) A 48.90 mL sample of 0.2040 M acid was reacted with an excess Na_2CO_3 to form 125.0 mL CO_2 at 722 mmHg and 17 °C. If the acid is HCl or H_2SO_4, *WHICH IS IT? SHOW YOUR CALCULATIONS:*

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10) The pressure of oxygen gas, O_2, which exist in 200 mL flask was 2.7 mmHg at 15 °C. If 0.56 mg helium gas, He, was added to the flask, calculate the partial pressure of oxygen in this mixture:

a) 0.353 %   b) 0.42 %   c) 1.99 %   d) 0.00043 %

11) What will be the final temperature of a mixture made from 25.0 g of a liquid at 15 °C, 45.0 g of the same liquid at 50 °C, and 15.0 g of this liquid at 37.0 °C:

a) 37.41 °C   b) 37.50 °C   c) 93.75 °C   d) 109.23 °C

12) Given the following thermochemical equation:

$$C_6H_6(l) + 15/2\ O_2(g) \rightarrow 6\ CO_2(g) + 3\ H_2O(l) \quad \Delta H^o = \textbf{-3271 kJ}$$
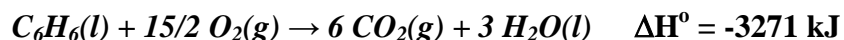
If the heat of formation ΔH^o_f of $CO_2(g)$ and $H_2O(l)$ are -394 kJ/mol and -286 kJ/mol respectively. The heat of formation ΔH^o_f of $C_6H_6(l)$ is:

a) -320 kJ/mol   b) 49 kJ/mol   c) -78 kJ/mol   d) 173 kJ/mol

13) Calculate the wave length, λ (nm), for the radiation emitted when an electron transferred from fourth energy level to the first energy level:

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14) Molybdenum, Mo, is one of the transition elements which has the atomic number of 42:

    A. Write the electron configuration of Mo……………………………………….......
    ………………………………………………………………………………………..

    B. Determine the number of unpaired electrons……………………………………...

    C. Determine the number of valence shell electrons……………………………..........

    D. What are the four quantum numbers of the valance shell electron(s)…………..

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