CHEMISTRY 101
SECOND EXAM (162)

Name:_____ **Date: 30/4/2017**

Student no._____ **Section:**_____

Useful Information: *Gas Constant R= 0.08206 L.atm/K.mol, Specific heat of H_2O=4.18 J/g.°C*
1 atm. = 760 mmHg.

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

Important instructions:

1. **Examinationtime: 60 Minutes.**
2. Put any books/notebooks/sheets away and **turn off your cell phone**.
3. Write your name before starting with the questions.
4. The exam contains 5 pages in total, including the cover page and the scratch papers.
5. You may not borrow a calculator.
6. Any cheating signs may cause you to be expelled from the exam.

1) ***(1.0 point)*** **STP** for gases means:
A) 0 atm, 0 K
B) 1 atm, 25 °C
C) 0 atm, 1 K
D) 1 atm, 0 K
E) 1 atm, 273 K

2) ***(1.0 point)*** For a particular process q = +20 kJ and w = +15 kJ. Which of the following statements is **true**?
A) Heat flows from the system to the surroundings.
B) The system does work on the surroundings.
C) $\Delta U = 35$ kJ
D) B and C
E) All of the above are true.

3) ***(1.0 point)*** Given the reaction: $2Ca(s) + O_2(g) \rightarrow 2CaO(s)$,
A) Which species is oxidized……
B) Write the reduction half reaction…….

4) ***(1.0 point)*** A chunk of lead at 99.5°C was added to 100.0 g of water at 25.5°C. The specific heat of lead is 0.129 J/g°C, and the specific heat of water is 4.18 J/g°C. When the temperature stabilized, the temperature of the mixture was 30.9°C. Assuming no heat was lost to the surroundings, what was the mass of lead added?
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5) ***(2.0 points)*** A precipitation reaction occurs between aqueous sodium phosphate, Na_3PO_4 and aqueous barium chloride, $BaCl_2$:
A) Complete and balance the molecular equation that represents this reaction:
……Na_3PO_4 (aq) + …….$BaCl_2$ (aq) →.....(s) +.....(aq)

B) Write the Ionic equation:
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C) Write the net ionic equation:
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6) ***(1.5 points) An*** unknown **<u>diprotic acid</u>** requires 44.39 mL of 0.111 M NaOH to completely neutralize a 0.580-g sample of the acid. Calculate the approximate molar mass of the acid.

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7) ***(1.0 point)*** A gas sample is held at constant pressure. The gas occupies 3.62 L of volume when the temperature is 29.6°C. Determine the temperature at which the volume of the gas is 3.42 L.

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8) ***(1.5 points)*** What is the amount of heat released when 44.4 mL of 0.330 M sulfuric acid reacts with 28.3 mL of 0.399 M potassium hydroxide?

$\mathbf{H_2SO_4(}aq\mathbf{) + 2KOH(}aq\mathbf{) \rightarrow K_2SO_4(}aq\mathbf{) + 2H_2O(}l\mathbf{)}$ $\boldsymbol{\Delta H = -111.6\ kJ/mol}$

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9) ***(1.0 point)*** Which conditions of ***P*** and ***T*** are most representing the **<u>ideal gas</u>** with low **n** (moles)?

A) high P, high T
B) low P, low T
C) high P, low T
D) low P, high T
E) no relation

10) ***(1.0 point)*** If all of the chloride in a 3.734-g sample of an unknown metal chloride is precipitated as AgCl with 70.90 mL of 0.2010 M AgNO3, what is the percentage of chloride in the sample?

A) %50.52
B) %13.53
C) %1.425
D) %7.391
E) none of the above

11) ***(1.0 point)*** On a cold winter day, a steel metal box feels colder than a wooden box of identical size because:

A) The specific heat of steel is higher than the specific heat of wood.
B) The specific heat of steel is lower than the specific heat of wood.
C) The density of steel is higher than the density of wood.
D) The mass of steel is more than wood so it loses heat faster.
E) Two of the above statements are true.

12) ***(1.5 points)*** Consider the following processes:

	***ΔH* (kJ/mol)**
$E + A \rightarrow D$	350
$\frac{1}{2} A \rightarrow B$	150
$2C + D \rightarrow 3B$	+125.

Calculate Δ*H* for: ***B → E + 2C***

A) 325 kJ/mol
B) 525 kJ/mol
C) –175 kJ/mol
D) –325 kJ/mol
E) none of these

13) ***(1.5 point)*** Oxygen gas, generated by the reaction $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$ is collected over water vapor at 27°C in a 1.55-L vessel at a total pressure of 1.00 atm. (The vapor pressure of H_2O at 27°C is 26.0 torr.) How many moles of $KClO_3$ were consumed in the reaction?

A) 0.0405 moles
B) 0.0912 moles
C) 0.0608 moles
D) 0.0434 moles
E) 1.50 moles

SCRATCH PAPER