Prince Sultan University

CHEMISTRY 101
FIRST EXAM (162)

Name:_____ **Date: March 29th/2017**

Student no. _____ **Section:**_____

Useful Information:

General gas constant R=0.0821 atm.L/mol.K; $N_{avogadro}=6.02\times10^{23}mol^{-1}$

1atm=760 torr=760 mmHg =101325 Pa

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	**Lu**[71] 175.0	**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. **Examination time: 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 6 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.

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

1) ***(1.25 points)*** Perform the following arithmetic and express the answer to the correct number of significant figures *(Assume that all numbers are measured values)*:

$(\mathbf{6.167 + 68}) \div \mathbf{0.0510} =$……..

2) ***(1.0 point)*** A monolayer containing 3.23×10^{-6} g of oleic acid has an area of 20.0 cm^2. The density of oleic acid is 0.895 g / mL. What is the thickness of the monolayer (the length of an oleic acid molecule؟

A) 7.22×10^{-5} cm
B) 5.54×10^{-6} cm
C) 5.78×10^{-5} cm
D) 1.80×10^{-7} cm
E) 3.61×10^{-6} cm

3) ***(0.75 point)*** Which of the following statements ***is false?***

A) Solutions are homogeneous mixtures.
B) The terms "atom" and "element" can have different meanings.
C) Elements can exist as atoms or molecules.
D) Compounds can exist as atoms or molecules.
E) At least two of the above statements (A-D) are false.

4) ***(0.75 point)*** A student is using a poorly calibrated electronic balance of a ***bad quality*** to measure the mass of a beaker. His technique in making the measurement is very careful and he repeats it three times. What will likely characterize his measurements?

A) low accuracy and high precision
B) high accuracy and low precision
C) high accuracy and high precision
D) low accuracy and low precision
E) the data are not enough to predict the result.

5) ***(0.75 point)*** An unknown element (X) is reacted with sulfur (S) to form an ionic compound with the chemical formula of X_2S. which of the following elements is the most likely identity of X?

A) Mg B) Li C) H D) O E) Cl

6) ***(1.5 points)*** Name the following compounds:

A) $K_2Cr_2O_7$……..

B) MgS_2……..

C) SiF_4 ……

7) ***(1.0 point)*** Which of the following pairs is **INCORRECT**؟

A) Monoiodine trichloride, ICl_3

B) Mercury(I) iodide, HgI.

C) Ammonia, NH_3

D) Sulfur hexafluoride, SF_6

E) A and B.

8) ***(0.75 point)*** Which statement is **INCORRECT** ؟

A) An atom of ^{60}Zn has an equal number of protons and neutrons
B) An atom of ^{50}Mn has an equal number of electrons and neutrons
C) An atom of ^{18}O has an equal number of protons and neutrons
D) An atom of ^{41}K has an equal number of protons and electrons
E) An atom of ^{197}Au contains 118 neutrons.

9) ***(2.0 points)*** An aqueous solution of ammonium chloride, NH_4Cl was prepared by dissolving 50 g of the salt in enough water to make 300 mL solution.

A) ***(0.5 point***) Calculate the molarity of this solution:

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B) ***(0.75 point***)What volume of water is needed to dilute this solution into 1 M?

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C) ***(0.75 point***)If 200 ml of 0.8 M NH_4Cl solution were added to the 300 mL of the original NH_4Cl solution prepared in this question. What will be the new concentration of this new solution?

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10) ***(1.0 point)*** A mixture of KCl and KNO_3 is 44.20% potassium by mass. The percentage of KCl in the mixture is closest to:

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11) ***(2.25 points)*** A sample of magnesiumphosphate hydrate, $Mg_3(PO_4)_2.H_2O$, has a mass of 2.0 grams.

A) ***(0.5 point***) Calculate the number of moles of this sample?

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B) ***(0.75 point***) How many oxygen atoms exist in the sample?

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C) ***(1 point***) What is the mass of three compounds (or molecules) of this sample?

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12) ***(3.0 points)*** Suppose the following **<u>Unbalanced</u>** equation:

$Mg_3(PO_4)_2 + H_2SO_4 \rightarrow MgSO_4 + H_3PO_4$ is carried out starting with 103 g of $Mg_3(PO_4)_2$ and 80.8 g of H_2SO_4.

A) ***(1 point***) Balance the chemical equation:

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B) ***(1 point***) Determine the limiting reactant by calculations:

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C) ***(1 point***) If the percentage yield of this reaction is 70%, what mass of H_3PO_4 will be collected experimentally?

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Scratch Paper