College of Industrial Technology

King Mongkut's University of Technology North Bangkok

เลขที่นั่งสอบ

Final Examination of Semester 1 **Year:** 2017

Subject: 392151 Chemistry I **Section:** 15-18

Date: 30 November 2017 **Time:** 10.00-12.00

Name: _____ ID: _____ Class: _____

Instructions:

1. The examination has 7 pages (including this page), 2 sections and a total score of 50 points.
2. Write all your solutions and answers on this examination sheet.
3. This is a closed book examination.
4. You are not allowed to leave the examination room during the first hour after the beginning of the exam.
5. You are not allowed to open the exam papers or start to answer before the proctor's permission.
6. You are not allowed to use restroom during the exam except in case of an emergency.
7. No documents are allowed to be taken out of the examination room.
8. Calculators are **NOT** allowed in the examination.
9. Electronic communication devices are **NOT** allowed in the examination room.

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Cheating in the exam is considered an extremely serious offence which will result in expulsion from the University.

Given relative atomic mass

C = 12	Cl = 35.5	Ag = 108	Au = 197	S= 32	Co= 59
H = 1	Na = 23	Ca = 40	Li = 7	O= 16	
He = 4	Cr = 52	K = 39	Fe = 56	La= 139	

	Multiple Choice	Part 2.1	Part 2.2	Part 2.3	Total
score					

Part 1. Multiple Choice (15 pts)

Choose the letter of the choice in the answer table that best completes the statement or answers the question.

Question no.	a.	b.	c.	d.
1				
2				
3				
4				
5				
6				
7				
8				

Question no.	a.	b.	c.	d.
9				
10				
11				
12				
13				
14				
15				
Total				

ลิขสิทธิ์เป็นของมหาวิทยาลัยสงขลานครินทร์

1. What is the average relative atomic mass of silver (Ag) from the following data

Isotope	Natural Relative Abundance (%)	Relative atomic mass
^{107}Ag	60	107
^{109}Ag	40	109

a. 107.5 b. 107.8 c. 108.0 d. 108.2

2. For Mg which its relative atomic mass of 24.31, which one is correct?

a. Mass of 2 moles of it is 48.62 g
b. 0.5 mole of it consists of 3.01×10^{23} atoms
c. Its molar mass is 24.31 g/mol
d. a, b, and c are correct

3. What is the relative molecular mass of H_2SO_4?

a. 70 b. 85.07 c. 98 d. 108

4. What is the percentage of Cl to the mass of a molecule of calcium chloride ($CaCl_2$)?

a. 54 % b. 64 % c. 74 % d. 84 %

5. 2 moles of carbon tetrachloride (CCl_4) contain

a. 4 moles of chlorine atoms b. 8 molecules of chlorine atoms

c. 1 mole of carbon atoms d. 8 moles of chlorine atoms

6. If 24 g of carbon is measured, how many atoms of carbon have been indirectly counted?

a. 2 b. 24 c. 6.02×10^{23} d. 1.20×10^{24}

7. What can be said about 1 mol Ag and 1 mol Au?

a. They are equal in mass. b. They contain the same number of atoms.

c. Their molar masses are equal. d. They have the same atomic mass.

8. Which of the following element contains the greatest number of atoms?

a. 4 g of He b. 3 g of H c. 0.4 g of Ca d. 46 g of Na

9. How many moles of CO_2 are present in a 1.12 dm^3 sample at STP?

a. 2 b. 1 c. 0.2 d. 0.05

10. What volume will 7.00 g of N_2 occupy at STP?

a. 5.6 dm^3 b. 11.2 dm^3 c. [illegible] dm^3 d. 44.8 dm^3

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11. How many moles of O atoms are needed to combine with 5 mol of P atoms to make P_2O_5?

a. 5 b. 10 c. 12.5 d. 25

12. Ammonia is produced according to the following equation: $N_2 + H_2 \longrightarrow NH_3$

How many moles of N_2 are required to produce 3 mol of NH_3?

a. 1 b. 1.5 c. 3 d. 4.5

13. Calculate the number of atoms in 4.0 mol H_2O.

a. 7.2×10^{24} molecules b. 2.4×10^{24} molecules

c. 2.4×10^{23} molecules d. 6.0×10^{23} molecules

14. When the equation below is balanced and all coefficients reduced to lowest whole-number terms, the coefficient for H_2O is _____.

$$\_\_\_ La_2O_3(s) + \_\_\_ H_2O(l) \longrightarrow \_\_\_ La(OH)_3(aq)$$

a. 4 b. 3 c. 2 d. 1

15. According to the reaction in problem 14, how many grams of $La(OH)_3$ can be prepared from 2 mol of La_2O_3 with sufficient H_2O ?

a. 190 g. b. 380 g. c. 760 g. d. none of above

Part 2 Write your answer in the space provided for each question (35 pts)

1. The element rhenium consists of two isotopes ^{185}Re and ^{187}Re. The percent abundance of ^{185}Re is 40. Calculate the relative atomic mass of rhenium. (1 pt)

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2. The two naturally occurring isotopes of chlorine are ^{35}Cl with a mass of 35 amu and ^{37}Cl with a mass of 37 amu. The atomic mass of elemental chlorine on earth is found to be 35.5 amu. Calculate the percent abundance of each of the two chlorine isotopes. (2 pts)

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3. Calculate relative molecular mass and %Cr in the following molecules listed in the table. (6 pts)

	Relative molecular mass	% Cr
CrO_2		
$K_2Cr_2O_7$		
$Fe_2(Cr_2O_7)_3$		

4. Fill in the answer or show your short calculations for each of the following. (10 pts)

4.1 What is the molar mass of $CaCO_3$?

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4.2 What is the mass in grams of 0.05 mol Co?

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4.3 What is the number of moles of oxygen atoms do 1.5 mol of $C_9H_8O_4$ contain?

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4.4 What is the number of molecules in 36 g of H_2O?

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4.5 What is the total number of atoms in 0.250 mol of glucose, $C_6H_{12}O_6$?

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4.6 What is the volume of 2.0 mol of He occupy at STP?

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4.7 What is the number of N atoms are in 5.00 mol of N_2O_5?

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5. What is the mass (grams) and the number of molecules present in 4.48 L CH_4 at STP? (3 pts)

6. 6.1 How many moles of O atoms are in 125 g of SO_3? (4 pts)

   6.2 If 80 g of unknown element (X) are needed to combine with 4 mol of Cl to make XCl_2, what is the molar mass of XCl_2 compound?

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7. Balance the following reactions: (4 pts)

7.1 _____ NaBr + _____ Cl_2 ⟶ _____ NaCl + _____ Br_2

7.2 _____ Fe + _____ Cl_2 ⟶ _____ $FeCl_3$

7.3 _____ C_6H_5COOH + _____ O_2 ⟶ _____ CO_2 + _____ H_2O

7.4 _____ Fe_2O_3 + _____ C ⟶ _____ Fe + _____ CO_2

8. Given the equation: $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$ Calculate the following:

8.1 How many grams of Fe are produced from 1.80 mol of CO?

8.2 How many moles of Fe_2O_3 are needed to produce 66 g of CO_2? (5 pts)

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