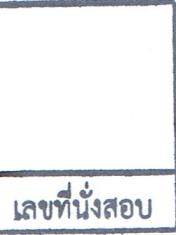


College of Industrial Technology
King Mongkut's University of Technology North Bangkok



Final Examination of Semester 1

Subject: 392151 Chemistry I

Date: 29 November 2018

Year: 2018

Section: 15-18

Time: 10.00-12.00

Name: _____ ID: _____ Class: _____

Instructions:

1. The examination has 8 pages (including this page), 2 sections and a total score of 51 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 exam 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.

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

Periodic Table of the Elements

1 hydrogen H 1.0079	2 helium He 4.0026	3 lithium Li	4 beryllium Be	5 magnesium Mg 9.0122	6 sodium Na 22.990	7 potassium K 39.098	8 calcium Ca 40.018	9 strontium Sr 87.62	10 barium Ba 137.33	11 radium Ra 88.123	12 francium Fr [223]
13 boron B 10.811	14 carbon C 12.011	15 nitrogen N 14.007	16 oxygen O 15.999	17 fluorine F 18.998	18 neon Ne 20.180	19 argon Ar 39.948	20 krypton Kr 36.936	21 chlorine Cl 35.453	22 bromine Br 32.055	23 iodine I 79.904	24 xenon Xe 83.80
25 manganese Mn 54.938	26 iron Fe 55.845	27 cobalt Co 58.933	28 nickel Ni 59.693	29 copper Cu 63.546	30 zinc Zn 65.39	31 gallium Ga 69.723	32 germanium Ge 72.61	33 arsenic As 74.922	34 antimony Sb 78.96	35 tellurium Te 79.904	36 polonium Po 126.90
37 chromium Cr 51.996	38 molybdenum Tc 91.941	39 technetium Ru 98.931	40 rhodium Pd 101.942	41 palladium Ag 107.87	42 osmium Rh 102.91	43 iridium Ir 106.42	44 platinum Pt 108.96	45 gold Au 110.97	46 mercury Hg 112.41	47 thallium Tl 118.71	48 lead Pb 121.76
49 vanadium V 50.942	50 niobium Nb 92.906	51 tantalum Ta 95.94	52 rhenium Re 96.95	53 osmium Os 104.97	54 iridium Ir 106.98	55 platinum Pt 107.99	56 gold Au 108.97	57 mercury Hg 110.97	58 thallium Tl 112.41	59 lead Pb 118.71	60 polonium Po 127.60
61 neodymium Pr 141.24	62 promethium Pm 145.936	63 europium Eu 151.96	64 gadolinium Gd 157.25	65 terbium Tb 158.93	66 dysprosium Dy 162.50	67 holmium Ho 164.93	68 erbium Er 167.26	69 thulium Tm 168.93	70 ytterbium Yb 173.04	71 lutetium Lu 174.95	72 neptunium Bk 175.01
73 tungsten W 180.95	74 rhenium Os 182.21	75 rhodium Ir 189.22	76 osmium Pt 190.23	77 platinum Pt 195.08	78 gold Au 196.97	79 mercury Hg 200.59	80 thallium Tl 204.38	81 lead Pb 207.7	82 polonium Po 208.98	83 polonium Po 209.98	84 astatine At 210.98
85 seaborgium Sg 106.95	86 dubnium Ds 108.97	87 meitnerium Mt 110.97	88 hassium Hs 111.97	89 bohrium Bh 110.97	90 meitnerium Mt 111.97	91 ununbium Uut 112.97	92 ununbium Uup 113.97	93 ununbium Uuh 114.97	94 ununbium Uus 115.97	95 ununbium Uuo 116.97	96 ununbium Uuo 117.97
97 neptunium Np [237]	98 uranium U [238]	99 neptunium Cm [243]	100 curium Bk [247]	101 curium Cf [251]	102 berkelium Bk [257]	103 californium Cf [258]	104 mercury Es [252]	105 mercury Fm [257]	106 mercury Md [258]	107 mercury No [259]	108 mercury No [259]

■ Lanthanide series	lanthanum La 138.91	cerium Ce 140.12	praseodymium Pr 141.91	neodymium Nd 144.24	europium Eu 145.936	samarium Sm 150.36	gadolinium Gd 151.96	terbium Tb 158.93	dysprosium Dy 162.50	holmium Ho 164.93	erbium Er 167.26	thulium Tm 168.93	ytterbium Yb 173.04		
■ Actinide series	actinium Ac 89	thorium Th 232.04	protactinium Pa 231.04	uranium U 238.03	neptunium Np [237]	plutonium Pu [243]	americium Am [247]	curium Cm [243]	berkelium Bk [247]	californium Cf [251]	curium Cf [257]	mercury Es [252]	mercury Fm [257]	mercury Md [258]	mercury No [259]

	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				

1. What is the number of moles in 432 g $\text{Ba}(\text{NO}_3)_2$?
 a. 0.237 mol b. 0.605 mol c. 1.65 mol d. 3.66 mol
2. What is the mass of 5.55 moles of carbon monoxide?
 a. 155 g b. 78 g c. 222 g d. 244 g
3. What is the percent by mass of carbon in acetone, $\text{C}_3\text{H}_6\text{O}$?
 a. 27.58% b. 10.34% c. 20.7% d. 62.1%
4. If a single molecule of CO_2 has a mass of 44.0 amu, then $2 \times 6.02 \times 10^{23}$ molecules have a mass of _____ grams.
 a. 6.02×10^{23} b. 44.0 c. 88.0 d. 265
5. An unknown gas is found to consist of 10.48 g of nitrogen and 11.96 g of oxygen. What is the percentage composition of this gas?
 a. 28.6% N, 71.4% O b. 46.7% N, 53.3% O
 c. 53.3% N, 46.7% O d. 74.5% N, 25.5% O
6. The number of atoms in a mole of any pure substance is called _____.
 a. its atomic number.. b. its mass number.
 c. Avogadro's number. d. its gram-atomic number.
7. What is the mass of 5 moles of CO ?
 a. 150 g b. 140 g c. 30 g d. 28g

8. The molecular formula for vitamin C is $C_6H_8O_6$, how many moles of H are in 1.1 moles of this compound?

- a. 6 mol H b. 8 mol H c. 6.6 mol H d. 8.8 mol H

9. How many moles of atoms in 2 moles of H_2CO_3 ?

- a. 10 mol b. 5 mol c. 6.02×10^{23} atoms d. none of above

10. Which of the following element contains the greatest number of mass (in grams)?

- a. 4 mol He b. 100 amu c. 12 g of Na d. 500 H_2 molecules

11. Three 1.0 liter flasks at STP are filled with H_2 , O_2 and Ne, respectively. Which of the following statement is true?

- a. Each flask has the same number of gas molecules.
- b. The velocity of the gas molecules is the same in each flask.
- c. The density of each gas is the same.
- d. There are twice as many O_2 and H_2 molecules as Ne atoms.

12. What is correct about 3.01×10^{23} molecules of oxygen gas at STP?

- a. They weigh 8 g at 1 atm.
- b. They occupies 22.4 dm^3 at $0^\circ C$.
- c. They are equal to 0.5 mole at 273 K.
- d. All of them are correct.

13. If the reaction below takes place at STP, which statement is wrong?

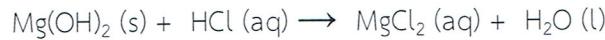


- a. 1 mole of oxygen gas provides 36 g of water vapor
- b. 1 mole of water vapor can be formed from 6.02×10^{23} of hydrogen gas molecules
- c. 22.4 L of the product can be obtained from 22.4 L of the reactants.
- d. Product molecules are not equal to reactant molecules.

14. Ammonia gas reacts with oxygen gas completely to form nitrogen monoxide gas and water vapor. The chemical reaction is written as $NH_3(g) + O_2(g) \rightarrow NO(g) + H_2O(g)$. Balance the chemical reaction and specify the correct statement.

- a. Number of molecules of NH_3 and NO gases are the same.
- b. Number of reactant molecules and product molecules are not different.
- c. Mole of water vapor is less than the mole of NO gas
- d. Mole of ammonia gas is higher than the one of oxygen gas.

15. What is the summation of stoichiometric coefficients for the following chemical reaction?



- a. 0 b. 4 c. 5 d. 6

Part 2 Write your answer in the space provided for each question (36 pts)

1. In a sample, you have 90% ^{32}S and 10% ^{34}S . Calculate the relative atomic mass of an atom in that sample. (2 pts)

2. Calculate the percentage composition by mass of each element in SO_3 (3 pts)

3. How many grams of O that is contained in 2.84 g of P_4O_{10} ? 17.28 (2 pts)

วิทยาลัยเทคโนโลยีสีลม

4. Calculate the number of moles of each compound: (2 pts)

- a. 0.224 L of N₂ at STP
 - b. 3.01×10^{24} C₄H₁₀ molecules

5. For a sample of 0.2 moles of acetic acid (CH_3COOH), calculate (2 pts)

 - the mass in grams of this sample.
 - the number of moles of hydrogen atoms (H) in this sample.

6. Calculate number of molecules and volume of CO_2 132 g at STP (2 pts)

תְּהִלָּה בְּרִית מָמוֹנָה בְּבֵין כָּל-עַמִּים

7. Calculate the number of moles of each substance below (2 pts)

 - 3.7 g of lithium carbonate (Li_2CO_3)

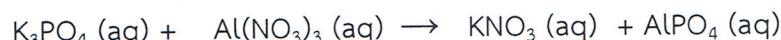
.....
.....
.....
.....
.....

- b. 4.4 amu of carbon dioxide (CO_2)

8. Balance all the following equations (5 pts)



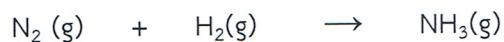
9. According to the following equation:



How many moles of KNO₃ are produced when 5 moles of K₃PO₄ react? (1.5 pts)

.....
.....
.....
.....
.....
.....
.....

10. a. Balance the following chemical equation below (4.5 pts)



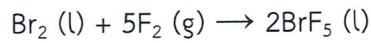
b. According to the equation above, what volume of NH₃ will be produced from 6 mol of H₂? (assume the reaction is performed at STP).

.....
.....
.....
.....
.....
.....
.....

c. What mass of NH₃ will be produced from 1 g of H₂?

.....
.....
.....
.....
.....
.....

11. Given the following equation below, (4 pts)



a. Find how many molecules of BrF₅ are formed when 200 g of Br₂ reacts with excess F₂.

.....
.....
.....
.....
.....
.....

b. Determine the minimum mass of F₂ for the reaction condition as mentioned in a.

.....
.....
.....
.....
.....
.....
.....

12. Use the balanced equation: 2Na (s) + O₂ (g) → Na₂O (s). At the beginning of the reaction, volume of O₂ is 2.24 dm³ at 1 atm and 273 K (0 °C). The reaction is completed after 10 minutes.

a. Determine the mass of Na for completely reacting with oxygen gas.

(2 pts)

.....
.....
.....
.....
.....
.....
.....

b. Calculate number of Na₂O molecules.

(2 pts)

รุ่งยาลัยเทคโนโลยีอุตสาหกรรม

.....
.....
.....
.....
.....
.....
.....
.....

c. Predict the volume of gas at the end of the reaction with the short explanation. (2 pts)

.....
.....
.....
.....
.....
.....
.....
.....

Monrudee Phongaksorn

Sunanta Chuayprakong

Nathjanan Jongkon