

APRIL, 2021  
EBS 302P  
GENERAL CHEMISTRY  
PRACTICALS III  
2 HOURS

CANDIDATE'S INDEX NUMBER:

SIGNATURE:

UNIVERSITY OF CAPE COAST  
COLLEGE OF EDUCATION STUDIES  
SCHOOL OF EDUCATIONAL DEVELOPMENT AND OUTREACH  
INSTITUTE OF EDUCATION

FOUR-SEMESTER BACHELOR OF EDUCATION PROGRAMME  
THIRD YEAR, END-OF-FIRST SEMESTER EXAMINATION, APRIL, 2021

APRIL 7, 2021

GENERAL CHEMISTRY  
PRACTICAL III

9:00 AM – 11:00 AM

(60 MARKS)

Answer any TWO questions.

1. a. A metal was reacted with dilute mineral acid to give a colourless gas, X. X was mistakenly passed over very hot copper (II) oxide before collection. The error was corrected by replacing the oxide with anhydrous calcium chloride, and the gas then collected in an inverted test tube.
  - i. Identify the gas, X. [2 marks]
  - ii. Why was the copper (II) oxide replaced with anhydrous calcium chloride. [3 marks]
  - iii. Name the substance that could be used in place of anhydrous calcium chloride. [3 marks]
  - iv. Name the method of collection of the gas. [3 marks]
  - v. Why was that particular method of collection used? [2 marks]
  - vi. Name another gas that can be collected in a similar way. [2 marks]
  - vii. Why is it possible to collect the gas over water? [2 marks]
  - viii. How would you test for the gas? [3 marks]
  
- b. Write the chemical equations which are responsible for the following observations:
  - i. Ammonia gas produces dense white fumes with conc. HCl vapour. [2 marks]
  - ii. Carbon dioxide gas turns aqueous calcium hydroxide milky. [2 marks]
  - iii. Name the substance responsible for the observations in (a) i and ii [2 marks]
  - iv. State two properties of carbon dioxide which makes it ideal for use in fire extinguishers [4 marks]

2. Fill in the missing letters in the test, observation and inference columns. The tests were carried out on the aqueous filtrate and residue of a mixture of two salts.

Tests	Observation	Inference
a. On filtrate		
i. A portion of filtrate + drops of NaOH	White precipitate formed	A ..... [2 marks]
ii. Same portion of filtrate + excess NaOH	White precipitate did not dissolve	B ..... [2 marks]
iii. Another portion of the filtrate + aqueous AgNO <sub>3</sub>	C ..... [2 marks]	Cl <sup>-</sup> , Br <sup>-</sup> present
iv) D..... [2 marks]	Lower layer of CCl <sub>4</sub> was colourless	E..... [2 marks]
b. On residue		
i. A portion of the residue + dilute HCl	F ..... [2 marks]	CO <sub>2</sub> gas formed CO <sub>3</sub> <sup>2-</sup> suspected
ii. Gas from b(i) was bubbled through lime water	G..... [2 marks]	CO <sub>3</sub> <sup>2-</sup> confirmed
iii. Portion of b(i) mixture + dilute NH <sub>3</sub>	White gelatinous precipitate formed	H..... [2 marks]
iv. Mixture in b(iii) + excess dilute NH <sub>3</sub>	White precipitate dissolved in excess	I..... [2 marks]
v. Portion of b(i) + aqueous NH <sub>4</sub> Cl + H <sub>2</sub> S gas	J..... [2 marks]	K..... [2 marks]

- c. Identify the salts and indicate the one which is soluble and the other one which is insoluble in water. [8 marks]

3. a. Follow the instructions below and answer the questions which follow.

i. A student added 1cm<sup>3</sup> of an aqueous solution of a cation into a test tube and added a few drops of dilute NaOH (aq) and observed a white chalky precipitate, name the cations that are likely to be present. [4 marks]

ii. Excess dilute NaOH (aq) was added to (a) and there was formation of insoluble precipitate. Name the cation present. [2 marks]

iii. A sample of an aqueous solution was added to  $1\text{cm}^3$  of dilute  $\text{NH}_3$  (aq) solution no precipitate was formed and there was no evolution of gas. Name the cations that are likely to be present. **[4 marks]**

iv. When a few drops of  $\text{NaOH}$  (aq) was added and warmed, there was evolution of gas. This gas was colourless and smells like urine. This gas also turns red litmus paper blue and gives a thick white fume with concentrated  $\text{HCl}$  (aq). Name this cation. **[2 marks]**

v. State **four** physical properties of oxygen. **[8 marks]**

b. Use this information to complete the table below,

Concentrated  $\text{H}_2\text{SO}_4$  was added to solid samples.

**[10 marks]**

Anion present in the solid	Observation
$\text{Cl}^-$	.....
I- (2 marks)	Evolution of violet $\text{I}_2$ vapour and rotten egg smell of $\text{H}_2\text{S}$ gas
.....	Evolution of $\text{SO}_2$ gas
$\text{SO}_4^{2-}$	.....
$\text{CO}_3^{2-}$	.....

