

SOUTH WEST REGIONAL MOCK EXAMINATION GENERAL EDUCATION

THE TEACHERS' RESOURCE UNIT (TRU)

IN COLLABORATION WITH

THE REGIONAL INSPECTORATES OF PEDAGOGY

AND

THE SOUTHWEST CHEMISTRY TEACHERS' ASSOCIATIONS (SOWECTA)

MONDAY: 27/03/2023-AFTERNOON

ORDINARY LEVEL

| | |
|---------------------|-----------|
| Subject Title | CHEMISTRY |
| Paper Number | Paper 2 |
| Subject Code Number | 0515 |

TWO AND A HALF HOURS

INSTRUCTIONS TO CANDIDATES:

Enter the information required in the boxes of the flap.

This paper is arranged in three sections, A, B and C.

Section A: Answer ALL FIVE (5) questions. You will be graded for the best 4 answers

Section B: Answer ALL TWO (2) questions using the spaces provided.

Section C: Answer any TWO (2) questions. If you attempt more than 2 questions, only the first 2 will be considered.

In calculations you are advised to show all steps in your working, giving your answer at each stage.

Calculators are allowed

You are reminded of the necessity for good English and orderly presentation in your answers

The mark allocation is indicated for each question.

USEFUL DATA: You may use the following figures in any questions where you need them.

1 Faraday (F) = 96000 coulombs

Specific heat capacity of water, $c = 4.2 \text{ J/g}^\circ\text{C}$

Molar volume of a gas at RTP = 24000 cm^3

RAM: (Na = 23, C = 12, O = 16, Cl = 35.5, H = 1)

SECTION A: Answer ALL 5 questions. You will be graded for the best four questions.

i) The composition of particles A – F (letters not their usual symbols) are given in the table below.

| Particles | Atomic number | Atomic Mass | Electronic Configuration |
|-----------|---------------|-------------|--------------------------|
| A | 17 | 37 | 2,8,7 |
| B | 12 | | 2,8,2 |
| C | 10 | 20 | 2,8 |
| D | 06 | 12 | 2,4 |
| E | 17 | 35 | |
| F | 11 | 23 | 2,8 |

a) Complete the table above (1mark)

b) Using letters A – F, select

i) A pair of isotopes

.....

ii) A noble gas

.....

iii) A positive ion

.....

(3 marks)

c) Write the formula of a compound formed between A and B

.....

(1 mark)

d) Write a balanced equation for the reaction between F and oxygen

.....

(2 marks)

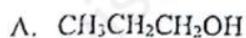
e) Draw dots and cross diagrams to show the bonding between D and Hydrogen

.....

(3 marks)

(TOTAL = 10 marks)

2) The structural formulae of two organic compounds A and B are shown below.



a) i. To which homologous series does A and B belong?

.....

(1 mark)

ii. What general name is used to describe the two structures?

.....

(1 mark)

b) Give the IUPAC name for compound B

.....
(1 mark)

c) Identify the gas produced when sodium metal is dropped in a beaker containing compound A.

.....
(1 mark)

d) i. Write an equation for the reaction between compound A and ethanoic acid.

.....
(1 mark)

ii. How would you identify the main products in (d) (i)

.....
.....
(1 mark)

e) Briefly describe a chemical test to identify the functional group in compound A

.....
.....
.....
(2 marks)

f) Give two large scale uses of compound A

.....
.....
(2 marks)

(TOTAL = 10 Marks)

3) A current of 0.2A was passed through an aqueous solution of copper (II) sulphate for 1hr 30mins using inert electrodes. A gas was produced at the anode

a) i) Identify the gas produced at the anode.

.....
ii) State one large scale use of the gas

.....
(2 marks)

b) i) What would you observe at the Cathode?

.....
ii) Write an equation to show the reaction at the Cathode.

.....
(2 marks)

c) Calculate the quantity of electricity passed in coulombs.

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

(2 marks)

d) State what will be observed at the anode and in the electrolyte.

At the anode

In the electrolyte

(2 marks)

e) Give two large scale uses of electrolysis in the industry.

.....
.....

(2 marks)

(TOTAL = 10 Marks)

4) This question concerns the following elements represented by their symbols;
Na, Cu, K, Mg and Ca.

a) Arrange the elements according to their families.

| Name of family | Element(s) |
|----------------|------------|
| | |
| | |
| | |
| | |

(3 marks)

b) Which of these elements does not evolve hydrogen gas with dilute acids?

.....

(1 mark)

c) Identify the element that reacts with cold water at room temperature and pressure and write an equation for the reaction.

Element

Equation

(3 marks)

d) Explain why pure magnesium oxide cannot be obtained by burning magnesium in air.

.....

(1 mark)

e) i. Name one other element that belongs to the same family as Cu

.....

ii. State one characteristic property of this family of elements.

(2 marks)

(TOTAL = 10 Marks)

5) Iron is extracted from its ore by chemical reduction.

a) State the main ore from which iron is extracted.

(1 mark)

b) State the functions of coke and limestone in the extraction process

i)Coke :

ii)Limestone:

(2 marks)

c) Write the main equation for the extraction of iron.

(2 marks)

d) Identify the main impurity in rough iron.

(1 mark)

e) Name one other metal extracted by chemical reduction.

(1 mark)

f) Give one advantage of steel over rough iron.

(1 mark)

g) State two large scale uses of iron.

(2 marks)

(TOTAL = 10 marks)

SECTION B: ALTERNATIVE TO PRACTICALS

Answer both questions in this section using the spaces provided. Both questions carry equal marks.

6) In order to determine the molarity of dilute HCl solution, a student is provided with the following; conical flask, phenolphthalein indicator, clamp and stand, burette, pipette and standard solution of Na_2CO_3

a) State the 3 steps involved in preparation of the standard solution

(3 marks)

b) 25 cm³ of a 0.1M solution of sodium carbonate is transferred into a flask X using equipment Y and three drops of phenolphthalein indicator is added. The solution is then titrated with dilute HCl till the end point is reached.

i) Name flask X and equipment Y

Flask X.....Equipment Y

(2 marks)

ii. Draw the experimental set up used in the titration indicating clearly the contents of all equipment used.

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

iii. State the colour change of the indicator at the end point.

Initial colour

Final colour.....

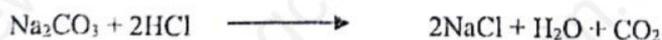
(2 marks)

c) In one such titration, a student obtained the following results for the volume of the acid.

| Final burette reading | approximate | Accurate 1 | Accurate 2 |
|-------------------------|-------------|------------|------------|
| | 16.3 | 33.3 | 49.6 |
| Initial burette reading | 0.0 | 17 | 33.4 |
| Titre | | | |

i. Complete the table above and determine the mean titre:

ii. Using your answer in (C) above, calculate the concentration of the dilute hydrochloride acid solution.



.....

.....

.....

.....

iii. State one of the precautions to be observed during the titration to ensure accurate results.

.....

(7 marks)

d) Complete the following table on separation of mixtures.

| Technique | Mixture |
|-------------------------|---|
| | Pigments from a leaf |
| Fractional distillation | |
| | A mixture of iodine crystals and powdered sulphur |

(3marks)

(TOTAL = 20marks)

7) Three bottles without labels containing three salts: X, Y and Z are presented to a student. A student carried out a series of tests to identify the different chemicals in the bottles.

a) i) A flame test is carried out on a sample of salt X. A golden yellow flame colour is seen. Describe briefly the procedure for flame test and identify the metal ion present in salt X

Procedure.....

Metal ion.....

(3 marks)

ii) A few drops of dilute HCl are added to solid X in a test tube. A colorless gas with the smell of a burning match is evolved. Identify the gas and the anion presented in salt X.

Gas: Anion:

(2 marks)

iii) Identify salt X.....

(1mark)

b) i) To a sample of salt Y in a test tube is added 3 drops of Barium Chloride solution followed by dilute HCl solution. A white precipitate is observed. The white precipitate does not dissolve in excess HCl. Identify the precipitate and anion in salt Y.

Precipitate..... Anion.....

(2 marks)

ii) Give the chemical identity of salt Y.....

(1mark)

c) i) Salt Z contains a bromide ion. State what will be observed if a few drops of aqueous silver nitrate are added to solution of salt Z

.....

(1mark)

ii) What physical test is used in the laboratory to easily identify bromine?

.....

(1mark)

iii) To a solution of salt Z is added a few drops of sodium hydroxide solution. A reddish brown precipitate is observed. Identify the precipitate and metal ion of salt Z.

Precipitate Metal ion.....

(2marks)

d) In order to prepare a pure dry sample of carbon dioxide, a student was provided with the following: A flat bottomed flask, a thistle funnel, a conical flask, a gas jar, delivery tubes and rubber bungs, dilute HCl, concentrated H_2SO_4 , and solid marble.

i) Describe the laboratory procedure used by the student. You can choose to describe by only drawing the experimental setup used.

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

(4 marks)

ii) Is it practically suitable to replace the dilute HCl with dilute H_2SO_4 ?

.....

(1 mark)

SECTION C

Answer only two questions in this section. If you attempt more than two questions, only the first two will be considered. Where appropriate, equations and diagrams should be used to illustrate your answer. Write your answers on the answer sheets that follow.

8) Using suitable examples, write short notes to distinguish between each of the following pair of terms.

- a) Oxidation and reduction
- b) Allotropy and allotropy
- c) Addition polymerization and condensation polymerization
- d) Neutralization and Esterification

(5, 5, 5, 5)

9) Bonding in substances can either be ionic, simple covalent or metallic.

- a) What is a chemical bond?
- b) Using suitable examples, describe how each bond type occurs.
- c) Give one property of each substance, stating how this property is related to the bond type.

(1, 16, 3)

10) Reversible reactions are used in the manufacturing of some chemicals.

- a) What is a reversible reaction?
- b) Give an example of a chemical whose manufacture involves a reversible reaction and describe how it is obtained from suitable raw materials.
- c) State two large scale uses of the chemical.

(1, 17, 2)

END