| REGISTRATION CENTRE NUMBER | CENTRE NAME | |
|---|---|---|
| CANDIDATE'S FULL NAMES | | |
| CANDIDATE IDENTIFICATION NUMBER | SUBJECT CODE **0515** | PAPER NUMBER **2** |
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**CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD**
**ORDINARY LEVEL EXAMINATION**

| SUBJECT TITLE | SUBJECT CODE | PAPER NUMBER |
|---|---|---|
| **CHEMISTRY** | **0515** | **2** |
| | EXAMINATION DATE: **JUNE 2019** | |

**Two and a half hours**

Enter the information required in the boxes above.

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

*Section A: answer 4 questions out of 5;*

*Section B: answer 2 question out of 3 and*

*Section C: answer both questions*

**In calculations, you are advised to show all the 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.***

**USEFUL DATA:**

**Relative Atomic Masses**
Hydrogen (H) = 1.0
Carbon (C) = 12.0
Oxygen (O) = 16.0
Copper (Cu) = 64.0

1 Faraday = 96000 coulombs.
Molar volume of a gas at r.t.p. = 24000cm$^3$,
Specific heat Capacity of water = 4.2J/g/°C
Avogadro Number = $6.02 \times 10^{23}$
0°C = 273K

**Turn Over**

| *FOR EXAMINERS' USE ONLY* | |
|---|---|
| Marked by…….<br>Signature of Examiner: ……..Date:…… | ***SCORE*** |
| Checked by……<br>Signature:…… Date:…… | |

**SECTION A: Answer ALL questions in this section.**

1. This question concerns the first four elements in group I of the periodic Table

| Element | Lithium (Li) | Sodium (Na) | Potassium (K) | Rubidium (Rb) |
|---|---|---|---|---|
| Atomic Number | 3 | 11 | 19 | 37 |

(a) (i) Why are they classified as Group I elements?

.....

..... .....

**(1 mark)**

(ii) Which of the element is the least reactive?

.....

**(1 mark)**

(iii) Write the electronic configuration of potassium (K)

.....

**(1 mark)**

(b) (i) Theses elements are usually stored under paraffin.

Explain.

.....

..... .....

(ii) Write an equation for the reaction between sodium and water.

.....

**(3 mark)**

(c) Lithium though in Group 1 of the P.T resembles Mg in Group II in its chemical properties.

(i) What name is given to this resemblance?

.....

(ii) State the products formed when the carbonates of Li and Na are strongly heated:

$Li_2CO_3$.....

$Na_2CO_3$.....

**(3 marks)**

(d) State the type of compound formed when Group I elements combine with non-metals

**(3 marks)**

**(Total = 10 marks)**

2. Aluminium is prepared industrially from purified bauxite by electrolytic reduction.

(a) (i) Write the formula of the oxide

.....

(ii) Write the cathode half reaction for the process

.....

**( 2 marks)**

(b) (i) Can chemical reduction be used to extract Al from its ore?

.....

(ii) Explain

.....

**( 2 marks)**

(c) (i) Why are Al extraction plants usually located near power station?

.....

.....

**(1 mark)**

(d) Give one large scale use of Al and relate this use to its property.

Use:

.....

Property:

.....

**(2 marks)**

(e) (i) State one metal that can be extracted by chemical reduction.

.....

(ii) Name an ore from which this metal is extracted

.....

(iii) Write an equation for the extraction process

.....

**(3 marks)**

**(Total = 10 marks)**

3. A homologous series of organic compounds has the general formula $C_nH_{2n+1}OH$.

(a) (i) What is a homologous series?

.....

.....

(ii) Give the general name of this homologous series.....

(iii) Name the second member of this series.....

**(3 marks)**

(b) Members of the above series can react with metals.

(i) Write a balanced equation to show how the second member of the series reacts with sodium.

.....

(ii) Name the non- gaseous product formed in b(i) above.

.....

**(2 marks)**

(c) The second member of the series reacts with ethanoic acid.

(i) What name is given to this type of reaction?.....

(ii) Write an equation for the reaction.

.....

(d) State one simple test for members of this homologous series.

.....

**(1 mark)**

(e) State two large Scale uses of the scale uses of the second member of this homologous series.

.....

.....

**(2 marks)**
**Total 10 marks**

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4. This question concerns the laboratory preparation of ammonia.($NH_3$) by reacting a mixture of ammonium chloride and calcium hydroxide.

(a) (i) Why is it advisable to grind the mixture of ammonium chloride and calcium hydroxide?

.....

.....

(ii) State the reaction condition .....

**(2 mark)**

(b) Write an equation for the reaction

.....

**(1 marks)**

(c) State the drying agent used

.....

**(1 marks)**

(d) Ammonia gas is used as reducing agent for Copper (II) oxide .

(i) Write an equation to show the reduction of $NH_3$

.....

(ii) State one observation when the Copper (II) oxide is reduced

.....

**(3 marks)**

(e) Give one large scale use of

(i) Nitrogen. .....

(ii) Ammonia.....

**(2 marks)**
**(Total = 10 marks)**

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5. Sulphur dioxide reacts with air according to the equation below

$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$ $\Delta H = -196KJ/mol$

.....

.....

(a) (i) Explain the meaning of $\Delta H = -196$ KJ/mol

.....

(ii) State two (2) reaction conditions for the above reaction

.....

.....

**(3 marks)**

(b) (i) State Le chatelier's principle

.....

.....

(ii) What will happen to the equilibrium position when

Pressure is increased? .....

Temperature is increased .....

**(3 marks)**

(c) What volume of oxygen is required to produce 300 $cm^3$ of $SO_3$ at room temperature and pressure?

.....

.....

.....

**(2 marks)**

(d) State one environmental hazard of $SO_2$

.....

**(1 mark)**

(e) Give one large scale use of $SO_3$ .....

**(1 mark)**

**Total 10 marks**

## SECTION B

Answer **ANY TWO** questions. All questions carry equal marks. Where appropriate, equations and diagrams should be used to illustrate your answer. Write your answers on the sheets that follow **Section C**.

6. Bonding in substances can either be ionic, simple covalent or metallic.
   (a) Define chemical bond.
   (b) Using appropriate diagrams, describe how each bond type occurs in a named substance.
   (c) Give one property of each substance, stating how this property is related to the bond type.

**(1, 15, 4 marks)**

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7. (a) Define the following terms.
   (i) Solubility
   (ii) Solubility curve

   (b) The table below gives the solubility of potassium nitate ($KNO_3$) in grams per 100g of water at different temperatures.

| Temperature in °C | 0 | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|---|
| Solubility $KNO_3$ in g per 100g of $H_2O$ | 16 | 21 | 31 | 45 | 62 | 81 | 106 |

Plot the solubility of $KNO_3$ against temperature (X-axis)

(c) From the graph determine
   (i) The solubility of the salt at 45°C
   (ii) The temperature at which 40g of $KNO_3$ will saturate 100g of water

(d) (i) What mass of $KNO_3$ would be obtained when a saturated solution is cooled from 50 °C to 15 °C?
   (ii) Calculate the amount of substances of $KNO_3$ in mol found in 100g of water in d(i ) above

(e) State one use of solubility curves

**(3, 10, 2, 4, 1 marks)**

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8. Write short notes on each of the following
   (a) Polymorphism
   (b) Saponification
   (c) Isotopy
   (d) Hydrolysis

**(5, 5, 5, 5 marks)**

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## SECTION C

### ANSWER ALL QUESTIONS IN THIS SECTION

9. In order to determine the concentration of a dilute sulphuric acid solution, a student is provided with the following solutions and equipment:
0.25M Na OH, dilute HCl, Pipette, Burette, Conical flask, phenolphthalein indicator, clamp and stand.

(a) Draw the experimental set up you would use.

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**(3 marks)**

(b) 25 $cm^3$ of 0.25M Na OH was transferred into a conical flask and 3 drops of phenolphthalein indicator was added.

(i) Sketch and name the apparatus used to transfer the Na OH solution

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.....

.....

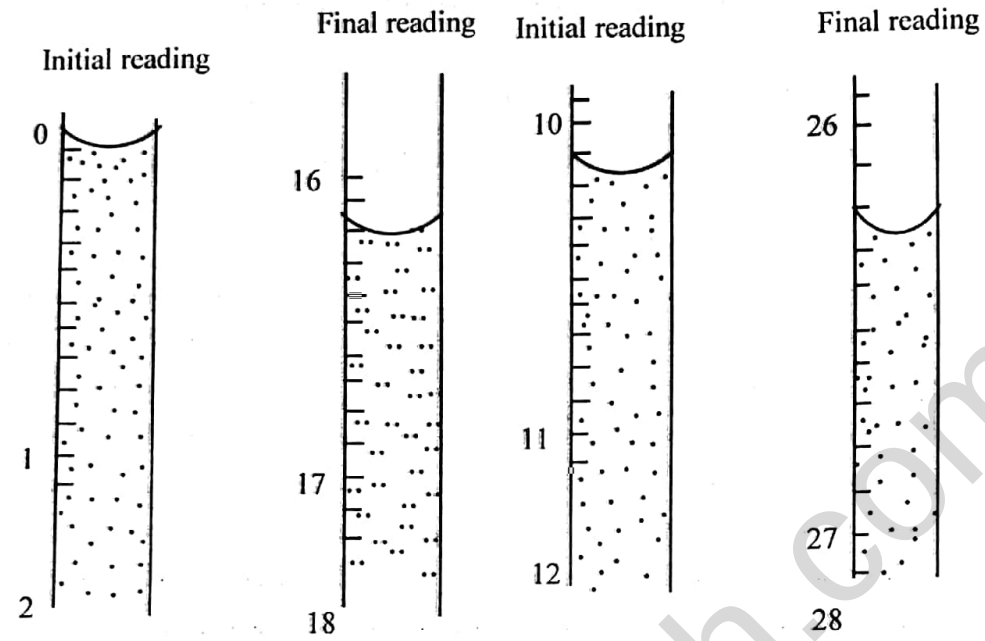
.....

(ii) Identify the liquid that is used to rinse the conical flask.

.....

**(3 mark)**

(c) The dilute acid was run from the burette and two accurate results were recorded as shown on the following diagrams:




**Experiment 1** **Experiment 2**

(i) Read and record the results of experiment 1 and 2 on the following table.

| | Experiment 1 | Experiment 2 |
|---|---|---|
| final reading | | |
| initial reading | | |
| Titre | | |

**(3 mark)**

(ii) Determine the mean type of the dilute sulphuric acid used.

.....

.....

**(1 mark)**

(iii) What will be the colour change to indicate the end of the experiment?

.....

**(1 mark)**

(iv) Calculate the concentration of the dilute sulphuric solution if $25cm^3$ of 0.25M Na OH was required.

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.....

.....

**(2 marks)**

(v) In carrying out this experiment the acid accidentally spilled on the student's hands. Advice the student on what should be done.

.....

**(1 mark)**

(d) You are given the following gases: $H_2$, $SO_2$, $NH_3$

Sketch the apparatus you would use to collect a pure sample of each gas in the laboratory.

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**(6 marks)**

**( Total = 20 marks)**

10. In order to determine the chemical composition of three unknown substances X, Y and Z, a student carried the following test.
Study the following table and complete the information needed.

| No | TEST PROCEDURE | OBERVATION | INFERENCE | |
|---|---|---|---|---|
| (i) | To $2cm^3$ of solution X is added 5 drops of Na OH(aq) warmed | A colourless pungent gas is evolved. The gas turns damp red litmus paper blue | | **(2 marks)** |
| (ii) | To $2cm^3$ of solution X is added 2 drops of BaCl(aq) followed by dil HCl(aq) | | Presence of $SO_4^{2-}$ ions | **(2 marks)** |
| (iii) | To $2cm^3$ of solurion Y is added 2 drops of Na OH(aq) | | Presence of $Fe^{2+}$ ions | **(1 mark)** |
| | | | | |
| (iv) | To $2cm^3$of solution Y is added a few drops of $AgNO_3$ followed by dil $HNO_3$ | A white ppt is formed | | **(1 mark)** |
| (v) | | Z gives a brick red flame colour | | **(3 marks)** |
| (vi) | A solid sample of Z strongly heated in a test tube | | $NO_2$ evolved<br>Presence $NO_3^-$ | **(1 mark)** |

(b) Give the chemical identity of
X.....
Y.....
Z ..... **(3 marks)**

(c) Complete the following table to show how you will separate thee mixtures.

| Mixture | Techniques of separation |
|---|---|
| Kerosine and water | |
| | Simple distillation |
| | Paper chromatography |
| Groundnut and its peelings | |

**(4 marks)**

(d) (i) In order to dilute an acid, a student added 410 $cm^3$ of distilled water to $10cm^3$ of concentrated sulphuric acid. State and justify what is wrong with this procedure .

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

(ii) Why is it advisable to wear eye goggles when working in the laboratory?

.....
.....

**(3 marks)**
**(Total = 20 marks)**