

REGISTRATION CENTRE NUMBER		CENTRE NAME	
CANDIDATE'S FULL NAMES			
CANDIDATE IDENTIFICATION NUMBER		SUBJECT CODE 0515	PAPER NUMBER 2
FOR OFFICIAL USE ONLY (Candidate Random CODE):		▶	
CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD ORDINARY LEVEL EXAMINATION			
SUBJECT TITLE CHEMISTRY		SUBJECT CODE 0515	PAPER NUMBER 2
EXAMINATION DATE: JUNE 2017			

Two and a half hours

Enter the information required in the boxes above.

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

Section A: answer 4 questions out of 5;

Section B: answer 2 questions 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.

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SECTION A: Answer 4 questions in this section.

1. Below is an incomplete Periodic Table with the letters O, P, Q, R, S, T and U representing some elements.
(These letters are not the usual symbols of the elements)

I	II		III	IV	V	VI	VII	VIII
						S		
O			R					U
		Q					T	
P								

(a) Give two elements found in the group of elements labelled Q
Fe, Zn Fe, Al, Cu

 (2 marks)

Using the letters only, answer the questions that follow

(b) Which of these elements is a noble gas?
U

 (1 mark)

(c) How many valence electrons does an atom of each of these elements have?
 (i) R? 3
 (ii) S? 6

 (2 marks)

Write down the formula of the compound formed between

(i) O and T OT
 (ii) S and Hydrogen SH₂

 (2 marks)

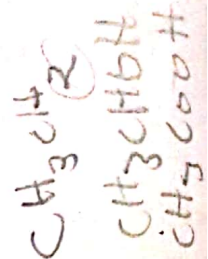
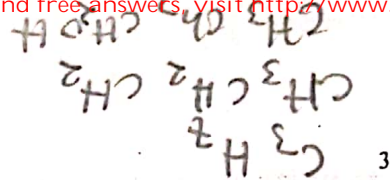
(d) Which type of bond exists in the compound formed in d(i) above?
Ionic bonding

 (1 mark)

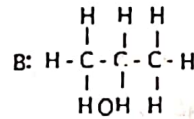
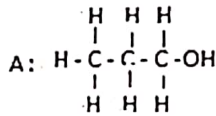
(e) Which of these elements is the most reactive
 (i) Metal? P
 (ii) Non metal? S

 (2 marks)

(Total= 10 marks)



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



(a) What is the name of

A? Prop-1-ol

B? Prop-2-ol

(2 marks)

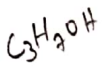
(b) To which homologous series do the two compounds belong?

Alcohols

(1 mark)

(c) (i) What would you observe when a piece of sodium is dropped in compound A?

Effervescence occurs as hydrogen is being liberated.



(ii) Write an equation for the reaction taking place



(3 marks)

(d) Compound A reacts with ethanoic acid.

(i) Identify the organic product formed and write an equation for the reaction.

Organic product: Propyl ethanoate



(ii) State the physical test for this product:

It has a sweet, fruity smell.

(iii) Give one large scale use of the organic product formed.

Use in the production of perfumes.

(4 marks)

(Total = 10 marks)

3. The table below shows some methods used to prepare salts in the laboratory

METHOD	STARTING MATERIAL	PRODUCTS
A	Solid X and dilute sulphuric acid	Copper(II) sulphate and water
B	Granulated zinc and liquid L	Zinc chloride and hydrogen
C	Solution O and solution P	Barium sulphate and sodium chloride

(a) Identify the substances X, L, O, P

X.....Copper (II) Oxide..... L.....Hydrochloric acid
 O.....BaCl₂..... P.....Na₂SO₄ chloride

(2 marks)

(b) Which of the methods A, B and C produces an insoluble salt? Write an equation for the reaction taking place

Method.....C.....
 Equation.....BaCl₂ + Na₂SO₄ → BaSO₄ + NaCl

(2 marks)

(c) Which of these methods is suitable for preparing magnesium sulphate? State the starting

Material.....Magnesium Ribbon and Hydrochloric acid
 Method.....B.....

(2 marks)

(d) A student in an attempt to obtain crystals of copper (II) sulphate, evaporated the salt solution to dryness.

(i) What is wrong with this procedure?

The student was not to evaporated away to dryness.

(ii) What is the correct procedure?

By heating the salt to crystallization

(2 marks)

(e) Give an example of

(i) An acid salt.....NaHSO₄

(ii) A deliquescent salt.....NaOH

(2 marks)

Total 10 marks)

4. The results of a soil analysis showed that the soil had a P^H of 5 and was also lacking in nitrogen. The farm was advised to apply lime and a nitrogenous fertilizer.

(a) (i) What would applying lime do to the soil?

To neutralise the acid soil.

(ii) Should the farmer apply quicklime (CaO) or slaked lime (Ca(OH)₂)? Explain your answer.

Choice of lime: Ca(OH)₂
 Reason for choice: bcz it is an alkaline salt that will easily neutralise the salt
 (3 marks)

(b) (i) What is a nitrogenous fertilizer?

Nitrogenous fertilizer are those fertilisers that contain Nitrogen as a component

(ii) Why do some plants not require nitrogenous fertilizers?

(2 marks)

(c) (i) What must happen to ammonium ions before the nitrogen in them can be absorbed by plants?

The NH₄ should be converted to Nitrate

(ii) What soil organism brings about the change in c(i)?

Nitrofixing bacteria

(2 marks)

(d) (i) Ammonium nitrate is manufactured from ammonia and nitric acid. State the process used to obtain each of these raw materials

Ammonia: Nitrogen and oxygen; Haber process

Nitric acid: Ammonia and oxygen; Ostwald process

(ii) Calculate the percentage of nitrogen in ammonium nitrate

$$\begin{aligned} \text{NH}_4(\text{NO}_3) &\Rightarrow 14 + 14 + 14 + (4 \times 16) \Rightarrow 80 \\ \text{N} &\Rightarrow 42 \quad \frac{42}{80} \times 100 \Rightarrow 52.5\% \end{aligned}$$

$$\begin{aligned} \text{NH}_4(\text{NO}_3) & \\ (14 \times 2) + (16 \times 3) & \\ 28 + 48 & = 76 \\ \frac{28}{76} \times 100 & = \frac{35}{2} = 17.5\% \end{aligned}$$

(3 marks)

Total 10 marks

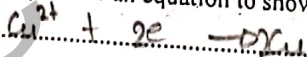
5. When 0.05 F of electricity was passed through an aqueous solution of copper(II) sulphate using inert electrodes, a gas was produced at the anode



(a) (i) What would you observe at the cathode?

The cathode gradually increase in size with time

(ii) Write an equation to show the reaction at the cathode



(1 mark)

(b) (i) Identify the gas produced at the anode.

Oxygen

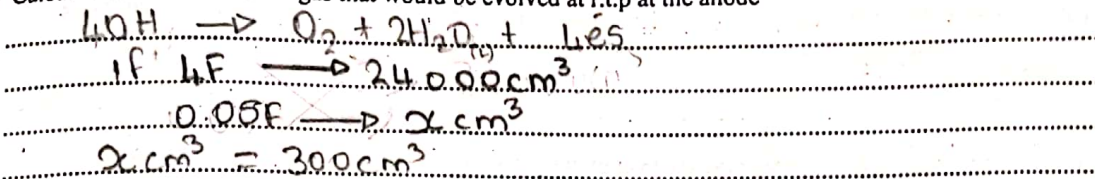
(2 marks)

(ii) State one large scale use of the gas in b(i)

used in respiration

(2 marks)

(c) Calculate the volume of the gas that would be evolved at r.t.p at the anode



(3 marks)

(d) In a similar experiment, the inert electrodes were replaced by copper electrodes?

(i) What would you observe at the anode?

It will decrease in size

(ii) Write an equation for the anode reaction



(2 marks)

(e) How is the observation in the electrolyte different when the inert electrodes are replaced by copper electrodes?

The electrolyte has acid due to the presence of H^+ and SO_4^{2-} that was not discharged to form H_2SO_4 with copper electrode no change is seen

(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 answer on the sheets that follow this section.

6. Briefly distinguish between the following pairs as used in Chemistry. Your answer should include suitable examples and/or equations.

- (a) Addition polymerisation and condensation polymerisation.
- (b) Etherification and hydrolysis
- (c) Oxidation and reduction
- (d) Substitution reaction and addition reaction.

(20 marks)

7. Metals can be extracted by electrolysis or chemical reduction, depending on their reactivity. For each method, select a metal and describe how the metal is extracted from a named ore. Give two large scale uses of each metal in Cameroon.

(20 marks)

8. (a) Describe a simple experiment to determine the heat of neutralisation of nitric acid (HNO_3) by potassium hydroxide (KOH). Your description should show clearly the set up, precautions taken, data collected and any assumptions made.

(b) In one such experiment, 50cm^3 of 1.0M HNO_3 solution were mixed with 50cm^3 of 1.0M KOH solution. Both solutions were initially at 20°C . Calculate the heat of neutralisation if the final temperature of the mixture is 23.5°C

(20 marks)

SECTION C

ANSWER ALL QUESTIONS IN THIS SECTION

9. You are provided with the following laboratory apparatus and chemicals: beaker, pipette, burette, conical flask, wash bottle and volumetric flask, 10.6g anhydrous sodium carbonate, dilute hydrochloric acid solution, distilled water and phenolphthalein indicator.

You are required to prepare 250cm^3 of a standard solution of sodium carbonate and use the solution to determine the molarity of the solution of dilute hydrochloric acid.

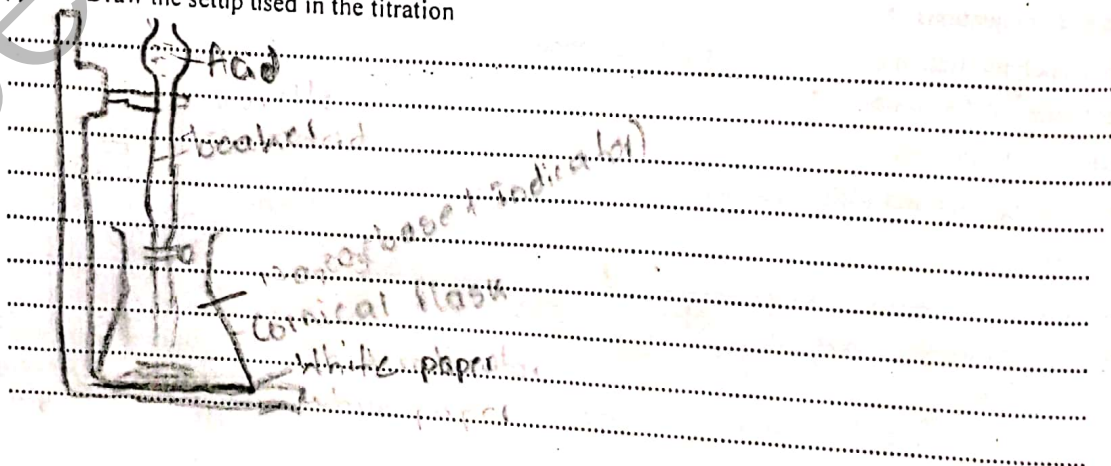
(a) State the three steps involved in the preparation of the standard solution

weigh exact mass (10.6g) of Na_2CO_3
Dissolve the salt in a beaker in a few distilled
H₂O and fill right up to the mark
then it to a volumetric flask and filled up to the mark

(2 marks)

(b) 25cm^3 of the standard solution is transferred into a conical flask and 3 drops of phenolphthalein indicator are added. The solution is then titrated with dilute hydrochloric acid till the end point is reached.

(i) Draw the setup used in the titration

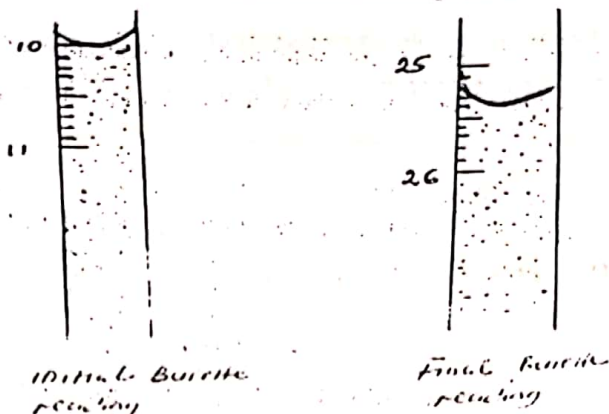


(2 marks)

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(ii) The colour change that occurs in the solution in the conical flask is from Colourless
 (Initial colour) to Pink (Colour at end point) (2 marks)

(c) The following diagram shows the initial and final burette readings for the titration



(i) Read and record the initial and final Burette readings.

Burette	
Initial burette readings	10.0 cm³
Final burette readings	25.4 cm³
Volume of acid used/cm³	15.4 cm³

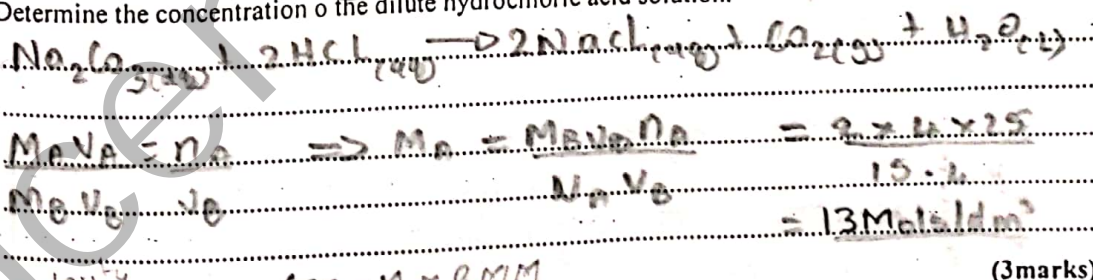
(ii) What is the volume of the hydrochloric acid used? 15.4 cm³ (2 marks)

(d) Calculate the molarity of the sodium carbonate solution

$$\text{Moles} = \frac{2.3 \times 2}{106} = 0.043$$

$$\text{Molarity} = \frac{\text{moles}}{\text{Vol (dm}^3\text{)}} = \frac{0.043}{0.025} = 1.72 \text{ mol/dm}^3$$

(e) Determine the concentration of the dilute hydrochloric acid solution.



$$\text{CON} = M \times \text{RMM}$$

$$= 1.72 \times 36.5$$

$$= 62.77 \text{ g/dm}^3$$

$$\text{Con (mol/dm}^3\text{)} = \text{Molarity}$$

$$\text{Con (grams/dm}^3\text{)} = \text{CON}$$

(f) You are given two salts: NaCl and CuSO₄. You are required to obtain crystals of each salt from the salt solution.

Briefly describe how you would obtain crystals of

NaCl... by evaporation to dryness

CuSO₄... heat up to a point of crystallisation

(4 marks)

(g) You are provided with the following techniques of separation: use of a separating funnel, winnowing, hand picking and fractional distillation.

Complete the following table by selecting the most convenient technique.

Mixture	Separation technique
Rice and beans	hand picking
Kerosene and water	separating funnel

(2 marks)

Total = 20 marks

10. (a) You are provided with the following reagents: aqueous NaOH, aqueous NH₃, aqueous BaCl₂, HCl, aqueous AgNO₃. You are required to carry out a series of tests on four salts A-D. Complete the following table showing observations and conclusions made by a student

	Test	Observations	Conclusions
(a)	To 2cm ³ of solution A add two drops of aqueous AgNO ₃	A pale yellow precipitate seen	bromide ion
(b)(i)	To 2cm ³ of solution B add two drops of BaCl ₂ followed by excess dilute HCl	white ppt	Presence of SO ₄ ²⁻
(b)(ii)	Carry out a flame test on a small portion of B	Bluish green flame colour	Copper (II) ion
(c)	To 2cm ³ of solution C add two drops of NaOH	A dirty green precipitate is observed	Iron (II) ion
(d)	To 2cm ³ of solution D add dilute HCl. Test for any gas evolved with lime water	Colourless, odourless gas evolved; gas turns lime water milky	CO ₃ ²⁻

(6 marks)

(e) (i) Suggest what salt B could be

CuSO₄

(2 marks)

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(ii) Identify the precipitate which is produced in test (a)

AgBr (silver bromide)

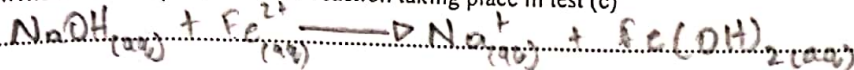
(1 mark)

(iii) Identify the gas evolved in test (d)

Carbon dioxide (CO₂)

(1 mark)

(iv) Write an ionic equation for the reaction taking place in test (c)



(3 marks)

(f) Identify a substance that is used in the laboratory

(i) To dry Ammonia gas

CaCl₂

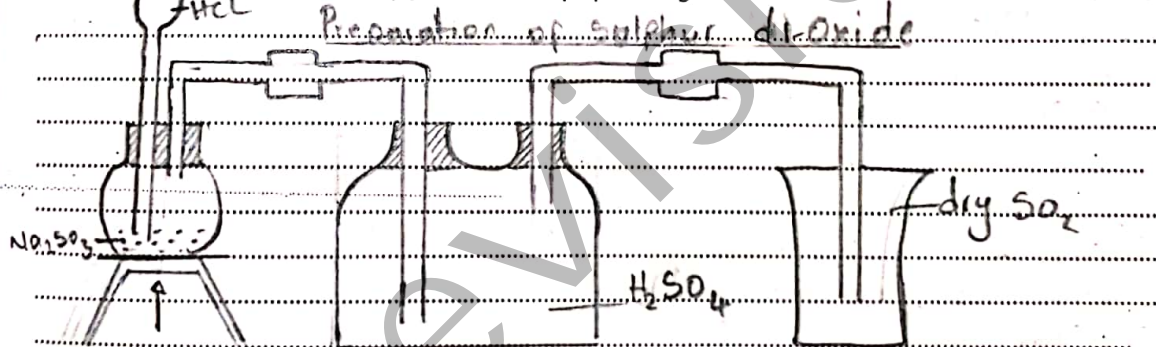
(ii) To test for the presence of water. Anhydrous CuSO₄ (white - blue)

(iii) For converting CuO to Cu. Hydrogen or Coke

(3 marks)

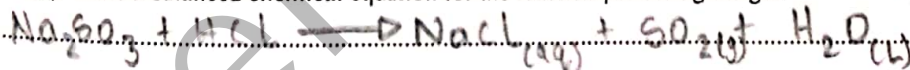
(g) You are expected to prepare a gas in the laboratory. You are provided with the following: solid sodium sulphite, dilute hydrochloric acid flat bottomed flask, Thistle funnel; delivery tubes, conc sulphuric acid, gas jar.

(i) Draw the experimental set-up you will use to prepare the gas



(4 marks)

(ii) Write a balanced chemical equation for the reaction producing the gas



(1 mark)

Total = 20 marks