Index No:

233/3 CHEMISTRY PRACTICAL PAPER 3 PRACTICAL 2 ¼ Hours Candidate's Signature Date.....



INSTRUCTIONS TO CANDIDATES

Name.....

- Write your **name** and **index number** in the spaces provided.
- Sign and write the date of examination in the spaces provided.
- Answer *all* the questions in the spaces provided in the question paper.
- You are not allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus you need.
- All working **must** be clearly shown where necessary.
- Mathematical tables and electronic calculators may be used.

Question	Maximum Score	Candidate's Score
1	20	
2	10	
3	10	
TOTAL	40	

For examiners use only

This paper consists of 6 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.



1. You are provide with

Solution A, Hydrochloric acid

Solution B, containing 8.8g per litre of sodium hydroxide

0.5g of an impure carbonate solid C

Procedure

(i) Fill the burette with sodium hydroxide, solution B

(ii) Pipette 25cm³ of hydrochloric acid, solution A into a conical flask

(iii) Add 2-3 drops of phenolphthalein indicator and titrate until a permanent pink colour appears

(iv) Repeat the titration two more times and complete the table

Table 1

	Ι	II	III
Final burrete reading (cm ³)			
Initial burette reading (cm ³)			
Volume of solution B(cm ³)			
(a) Find the average volume of solutior	1 B use	ed?	

(b) Determine the

(i) Concentration of solution B in moles per litre (Na=23.0, O=16.0, H=1.0) (1mk)

(11) Concentration of solution A in moles per litre (¹ / ₂ mk	(ii) Concentration of solution A in n	oles per litre	(¹ / ₂ mk)
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Procedure III

(i) Using a measuring cylinder, measure out 100cm3 of solution A into a 250cm3 beaker

(ii) Add all of solid C into the beaker containing solution A

(iii) Transfer all the solution into a 250ml volumetric flask and top up to the mark using distilled water. Label this as solution D

(v) Fill the burette with sodium hydroxide solution, B

(vi) Pipette 25.cm3 of solution D into a conical flask

(vii) Add 2-3 drops of phenolphthalein indicator and titrate until a permanent pink colour appears (viii) Record your results in table II below

(ix) Repeat the titration two more times and complete Table II

	1	11	III	
Final burrete reading (cm ³)				
Initial burette reading (cm ³)				
Volume of solution B(cm ³)				
(a) Find the average volume of sol	ution B us	ed?		(4mks) (1mk)
(b)Calculate the;	• • • • • • • • • • • • • • • • • • • •	•••••	•••••	
(i) moles of hydrochloric acid in	25.0cm3	of solu	tion D	$(1 \frac{1}{2} \text{ mks})$
(ii) Moles of hydrochloric acid in	n 250cm3	of solu	ution I	(1mk)

(iii) Moles of hydrochloric acid in 100cm3 of the original hydrochloric acid solution A (1mk)

(iv) Moles of hydrochloric acid that were used up in the reaction with solid C	(1mk)
(v) Moles of the carbonate that reacted with hydrochloric acid	(1mk)
(c) Given that the relative formula mass of the carbonate is 106, calculate the;(i) mass of the carbonate that reacted	(1mk)
(ii) percentage purity of the carbonate, solid C	(1mk)
You are provided with 4.0g of oxalic acid labeled solid Q You are required to determine the solubility of solid Q at different temperatures Procedures (i) Place all solid Q in a boiling tube and add 5cm ³ of distilled water using a burette (ii) Heat the mixture while stirring with thermometer to about 80°C until all the entire (iii) Allow the solution to cool while stirring with a thermometer and note the temperature	

crystals of solid \mathbf{Q} starts to appear. Record the temperature in table below

(iv) Using the burette, add $3cm^3$ of distilled water to the contents of the boiling tube. Heat the mixture while stiring with thermometer until the entire solid dissolves

(vi) Repeat the procedure and record the temperature in the table below

(vii) Complete the table by calculating the solubility of solid Q in g/100g of water

Volume of distilled water in the	Temperature in oC at	Solubility of solid Q in
boiling tube (cm ³)	which crystals first	g/100g of water
	appear	
5		
8		
11		
14		
17		

(5mks)

(a) On the grid provided, plot a graph of solubility of solid Q against temperature (3mks)

2.

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(b) Using your graph determine:

(i) the temperature at which 60g of solid Q would dissolve 100g of water $(\frac{1}{2} \text{ mk})$

- (ii) the percentage of solid Q, that will crystallize out when the saturated solution at 60°C is cooled to 40°C (1 ¹/₂ mks)
- 3. You are provided with solid L. carry out the tests below and record your observations and inferences in the spaces provide

(a)(i) Divide all the solid L in $10cm^3$ of distilled water in a boiling tube and shake thoroughly. Filter the mixture into another boiling tube. Retain for use in test 3(b) below

Observations	Inferences
(1mk)	(1mk)

(ii) To 20cm³ of filtrate add three drops of acidified Potassium dichromate (VI)

Observations	Inferences

(1mk)	(1mk)

(iii) To 2cm³ of filtrate, add all the sodium hydrogen carbonate

Observations	Inferences
(1mk)	(1mk)
(b)(i) To the residue in a boiling tube add 3cm3 of	
Observations	Inferences
(1mk)	(1mk)
(ii) To 2cm ³ of the mixture, add aqueous ammonia	drop wise until in excess
Observations	Inferences
(1mk)	(1mk)

