

FOCUS A365

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Name.....

Index No...../.....

School.....

Candidates Signature.....

Date

Kenya Certificate of Secondary Education (K.C.S.E)

CHEMISTRY

Paper 3

PRACTICAL

2 ¼

Instructions to candidates

- Write your name and Index Number in the spaces provided above.
- Sign and write date of examination in the spaces provided above.
- Answer **ALL** 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 that you may need.
- All workings **MUST** be clearly shown where necessary.
- Mathematical tables and silent electronic calculators may be used.

For Examiners use only.

Question	Maximum Score	Candidates Score
1	12	
2	12	
3	16	
TOTAL SCORE	40	

1. You are provided with;

- Solution C₁ which is a solution of a dibasic acid H₂C₂O₄XH₂O containing 5.04g in 500cm³ of solution.
- Solution C₂ which is a 0.2M solution of NaOH.

You are required to:

Determine the value of X in the formula H₂C₂O₄XH₂O (H = 1, C = 12, O = 16)

Procedure

- Fill the burette with solution C₁, Pipette 25cm³ of solution C₂ into a clean dry conical flask. Add 2 drops of phenolphthalein indicator and titrate against C₁ until the indicator just turns colourless.
- Repeat the procedure two more times and complete the table below.

Titration	I	II	III
Final burette reading (cm ³)			
Initial burette reading (cm ³)			
Volume of solution C ₁ used (cm ³)			

a) Calculate the average volume of C₁ used. (1mk)

b) Calculate the moles of the acid C₁ reacting. (3mks)

c) Calculate the concentration of the acid C₁ in the moles/litre. (2mks)

d) Calculate the relative formula mass of the acid. (3mks)

e) Hence, determine the value of X in the $H_2C_2O_4XH_2O$. (2mks)

2. You are provided with:
- 5g of solid K
 - Distilled water

You are required to determine solubility of K at different temperatures.

Procedure

- Transfer solid K into a boiling tube. Using a 10ml measuring cylinder, measure 10cm^3 of H_2O into the boiling tube. Heat the mixture while stirring with the thermometer to about 90°C . When all the solid has dissolved, allow the solution to cool while stirring with the thermometer.
- Record the temperature at which the crystals of solid K first appears in the table below.
- Measure 5cm^3 of distilled water and add to the mixture in the boiling tube. Heat until the crystals dissolves, then cool while stirring with a thermometer.
- Record this temperature at which the crystals again start to reappear.
- Repeat this procedure, each time adding more 5cm^3 of distilled water heating, cooling and recording the crystallization temperature until the table is completely filled.

Total volume of water added 5g of solid K (cm^3)	10	15	20	25	30	35
Temperature at which crystals appear ($^\circ\text{C}$)						
Solubility of K in g/100g of water						

a) Complete the table and calculate the solubility of solid K in g/100g H_2O at different temperature. (6mks)

- b) On the grid plot a graph of solubility of solid K against temperature. (3mks)
- c) From the graph determine;
- i) The solubility of K at 25⁰C. (1mk)
- ii) The temperature when the solution will contain 22g of K. (1mk)
- d) From your results, calculate the mass of K that will crystallize out when a hot solution at 52⁰C is cooled to 37⁰C. (1mk)

3. You are provided with solid F and P. carry out the test below. Write you observations and inferences in the spaces provided.

a) Using a clean spatula heat the solid F in a Bunsen burner flame.

Observations

Inferences

(½ mk)

(½ mk)

b) Place the remaining portion of solid F in a boiling tube. Add about 10cm³ distilled water. Stir and filter. Keep the residue for further tests. Divide the filtrate into four portions.

i) To the first portion; add NaOH solution till in excess.

Observations

Inferences

(1mk)

(1mk)

ii) To the second portion, add NH_4OH solution till in excess.

Observations

Inferences

(1mk)

(1mk)

iii) To the third portion, add $\text{Pb}(\text{NO}_3)_2$ then warm.

Observations

Inferences

(1mk)

(½mk)

iv) To the fourth portion, add BaCl solution followed by HCl .

Observation

Inferences

(½ mks)

(½ mk)

c) Dissolve the residue into 5cm^3 of 2M HCl and record observations and make inferences.

Observations**Inferences**

(½ mk)

(½ mk)

d) Carry out the following tests of P.

i) Using a clean metallic spatula heat solid P in a Bunsen burner flame.

Observations**Inferences**

(½ mk)

(½mk)

ii) Put two spatula-ful of P in a boiling tube. Add 10cm³ of distilled water. Warm the mixture to dissolve and divide the solution into 3 portions.i) To the first portion, add NaHCO₃**Observations****Inferences**

(½mk)

(½mk)

- ii) To the second portion add 3 drops of concentrated H_2SO_4 . Shake well and add 1cm^3 of Ethanol and warm the mixture.

Observations

Inferences

($\frac{1}{2}$ mk)

($\frac{1}{2}$ mk)

- iii) To the 3rd portion, add 1 – 2 drops of Acidified KmnO_4 solution.

Observations

Inferences

(1mk)

(1mk)

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