

Name _____ Index No. _____

Candidate's Signature _____ Date _____



SERIES 6 EXAMS

Kenya Certificate of Secondary Education

CHEMISTRY

PAPER 3

2 ¼ HOURS

INSTRUCTIONS TO CANDIDATES

- Answer all questions in the spaces provided.
- You are not allowed to start working with apparatus for the first 15 minutes of the 2 ¼ hrs 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 shown clearly.

Calculators and mathematical tables may be used.

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	18	
2	10	
3	12	
TOTAL SCORE	40	

1. You are provided with:
- Solid Q a metal carbonate X_2CO_3
 - Solution P hydrochloric acid
 - Solution R, 0.3M sodium hydroxide

You are required to:-

- (i) Prepare a dilute solution of hydrochloric acid and determine its concentration.
- (ii) Determine the solubility of solid Q in water.

Procedure

- (a) Place all solid Q in 250ml dry beaker. Add 100cm^3 of distilled water. Using a glass rod, stir the mixture thoroughly for about two minutes. Leave the mixture to stand and proceed with steps (b) and (c)
- (b) Using a pipette place 25cm^3 of solution P in 250ml volumetric flask. Add about 200cm^3 of distilled water to make upto the mark. Label this as solution S.
- (c) Fill a burette with solution R. Using a pipette place 25cm^3 of solution S into 250cm^3 conical flask. Add two drops of the indicator provided and titrate solution S against solution R. Record your results in table I. Repeat the titration two more times and complete table I. (Retain the remaining solution S for use in step (e)).
- (d) Filter the mixture obtained in step I using a dry filter funnel into a dry conical flask. Label the filtrate as solution Q.
- (e) Clean the burette and fill it with solution S. Using a pipette transfer 25cm^3 of solution Q into a 250cm^3 conical flask. Add two drops of the indicator provided and filtrate solution Q with solution S. Record your results in table II. Repeat the titration two more times and complete table II.

Table I

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution R used (cm^3)			

(4 marks)

(a) Calculate:

(i) Average volume of solution R used. (1 mark)

(iii) Moles of sodium hydroxide in the average volume of solution R used. (1 mark)

(iv) Moles of hydrochloric acid in 25.0cm^3 of solution S. (1 mark)

(v) The molarity of hydrochloric acid solution S. (1 mark)

Table II

	I	II	III
Final burette reading (cm ³)			
Initial burette reading (cm ³)			
Volume of solution S used (cm ³)			

(4 marks)

(b) Calculate

(i) Average volume of solution S used.

(1 mark)

(ii) Moles of hydrochloric acid in the average volume of solution S used.

(1 mark)

(iii) Moles of the metal carbonate; solid Q in 25cm³ of solution Q.

(2 marks)

(iv) The solubility of the metal carbonate solid Q in water (Relative formula mass of metal carbonate = 74 assume density of solution is 1g/cm^3) (2 marks)

2. You are provided with a solid E. Carry out the following tests and write down your observations and inferences in the spaces provided.

(a) Place half of the solid E in a dry test tube and heat. Test any gases produced using litmus papers.

Observation	Inference
(2 marks)	(1 mark)

(b) Add about 10cm^3 of distilled water to the remaining solid in a test tube and shake. Divide the solution into 3 portions.

(i) To the first portion, add barium nitrate about 1cm^3 and about 2cm^3 of dilute nitric (V) acid.

Observation	Inference
<p data-bbox="743 873 894 905">(1 ½ marks)</p>	<p data-bbox="1320 873 1430 905">(1 mark)</p>

(ii) To the 2nd portion, add ammonia solution dropwise till in excess.

Observation	Inference
<p data-bbox="743 1757 894 1789">(1 ½ marks)</p>	<p data-bbox="1320 1757 1430 1789">(1 mark)</p>

(iii) To the 3rd portion, add 3 drops of potassium iodide solution.

Observation	Inference
(1 mark)	(1 mark)

3. You are provided with solid F. You are required to carry out the test below.

(a) Divide solid F into two equal parts. To the first portion, ignite using a metallic spatula and a blue Bunsen burner flame

Observation	Inference

(1 mark)	(1 mark)
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(b) Place the remaining portion of solid F in a test tube and add 10cm³ of distilled water

Observation	Inference
(1 mark)	(1 mark)

(c) (i) To 2cm³ of solution F above add 3 drops of bromine water

Observation	Inference

(1 mark)	(1 mark)
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(ii) To 2cm³ of solution F add 3 drops of acidified K₂Cr₂O₇.

Observation	Inference
(1 mark)	(1 mark)

(iii) To 2cm³ of solution add 0.1g of sodium hydrogen carbonate provided

Observation	Inference
<p style="text-align: right;">(1 mark)</p>	<p style="text-align: right;">(1 mark)</p>

(iv) To 2cm³ of solution F add 3 drops of universal indicator and determine the pH.

Observation	Inference
<p style="text-align: right;">(1 mark)</p>	<p style="text-align: right;">(1 mark)</p>