SERIES 22 EXAMS

233/3

CHEMISTRY

TIME: 2 ¼ HOURS

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

MARKING SCHEME

INSTRUCTIONS TO CANDIDATES:

- *Answer all the questions in the spaces provided in the question paper.*
- *You are **NOT** allowed to start working with 2 ¼ hours allowed for this paper. This time is to enable you read the question paper and make sure you have all the chemicals and apparatus that you may need.*
- *All working **MUST** be clearly shown.*
- *Mathematical tables, and calculators may be used.*

For Examiner's Use Only:

Question	Maximum score	Candidates score
1	15	
2	10	
3	15	
Total score	40	

This paper consists of 8 printed pages. Candidates should check to ascertain that all papers are printed as indicated and that no questions are Missing

1.Awarding marks for the Table and averaging

- CT = complete table ….(maximum 1mk)

Conditions: -All three titrations done…… 1mk
-Two done……1 mk
- One done……0mk
Penalize a maximum ½ mk for any one of the following:

- Unrealistic burette readings e.g. beyond 50 cm^3
- Wrong arithmetic
- Inversion of the table

- D = Decimal place …….(maximum 1mk)

Conditions:- Tied to first and second rows only
-Use of one or two decimal places consistently. If two d.p. is used, then the second place must be 0 or 5.
Penalise fully for inconsistency in decimals as stated above.

- Acc. = accuracy……(maximum 1 mk)

Consider any one of the candidate's titre.
If within: ± 0.10cm^3 of school value (s.v) award 1mk
± 0.20cm^3 of school value (s.v) award ½mk
If beyond ± 0.20cm^3 award 0mk

- PA = Principle of averaging …..(maximum 1mk)

(i)Three titres averaged are within ± 0.2cm^3 of each other award 1 mk. If beyond this limit award 0mk.
(ii) Two titres averaged if only 2 titres are possible
(iii) If 2 titres are averaged when three are possible award 0mk.

- F.A = Final answer……..(maximum 1 mk)

Conditions: -Average titre to be recorded to 2d.p.
- The correctly averaged titre is compared to school value.
- Award marks as for accuracy:
Within ±0.10 cm^3 of school value award 1mk
Within ± 0.20 cm^3 of school value award ½mk

Calculations

(b) RMM of HCl=36.5 ½mk
Moles in 500 cm^3 = 2.07/36.5 ½mk

= 0.05671
Moles in 1000 cm^3 = 1000/500x0.05671 ½mk
= 0.1134
Molarity= 0.1134 M ½mk

(c) Average titre x Ans (b)//1000 ½mk
=0.002654 mol ½mk

(d) $Na_2CO_3(s) + 2HCl(aq) \longrightarrow 2NaCl(aq) + H_2O(l) + CO_2(g)$ 1 mk

(e) moles of Na_2CO_3 = 1//2 x moles of HCl in (c) above ½mk
= correct ans ½mk

(f) RFM of Na_2CO_3 = 106 ½mk
moles of Na_2CO_3 = Ans (e) x250/25 ½mk
= correct ans ½mk
Mass = ans above x RFM ½mk
= correct ans ½mk
(g) mass of NaCl = 2.0 – ans(f) ½mk
=correct ans
Percentage = Ans above/2 x 100 1 mk
= correct ans % ½mk

2. Completing the table ½ mark for each box correct to teachers value (10 x ½ = 5marks)

I Graph - Scale well labeled and covering $^3/_4$ of graph (1mark)
Give a maximum of1/ 2marks for inverted axes
- Plotting all the points correctly (1mark)
Award half mark for 4 points correctly plotted and
- Smooth curve passing through all the points (1mark) 3marks

II Answer correctly obtained from graph drawn(1/2mk) . The reciprocal should be converted to time to qualify for second1/2 mark. (1marks)

III the rate of reaction is directly proportional to $\frac{1}{time}$ (1mark)

3. I) You are provided with solid **K**. Carry out the tests below. Write your observations and inferences in the spaces provided.
Place all of solid K in a boiling tube, add about 10 cm^3 of distilled water and shake until all the solid dissolves. Divide the solution into 2 portions.

a) To the first portion in a test -tube, add a few drops of sodium hydroxide until in excess. **Retain** the mixture for procedure (b)

Observations	Inferences
No white ppt√**1** (1 mark)	NH_4^+,K^+,Na^+√**1** (1 mark)

b) Warm the mixture in (a) above and test any gases produced using red and blue litmus papers.

Observations	Inferences
A colourless gas is produced. Red litmus paper turns blue Blue litmus paper remains blue ½ mark each to a maximum of 1 mark (1 mark)	NH_4^+ confirmed√**1(tied to red litmus paper turning blue)** (1 mark)

c) To the last portion add 5 drops of aqueous sodium hydroxide then add the piece of aluminium foil provided to the mixture and shake. Warm the mixture and test any gases produced with both blue and red litmus papers.

Observations	Inferences
Effervescence. Colourless gas/gas with a pungent/choking smell Red litmus paper turned blue Blue litmus paper remained blue√**1** ½ mk each to a maximum of 1 mk (1 mark)	NO_3^-√**1(tied to red litmus turning blue)** (1 mark)

d) To the fourth portion, add lead (II) nitrate solution.

Observations	Inferences
White ppt√**1** (1 mark)	Cl^-√**1** (1 mark)

II) You are provided with substance Z. Carry out the tests below. Write your observations and inferences in the spaces provided.

a)Soop a little solid Z using a clean spatula and burn it in a Bunsen burner flame.

Observations	Inferences
Burns with a non-sooty flame√**1** (1 mark)	 absence Low C :H ratio√**1** (1 mark)

b) To about 2 cm^3 of Z, add a little distilled and shake.

Observations	Inferences
Z is miscible with water√**1** (1 mark)	Polar compound√**1** (1 mark)

c)To a little amount of Z in at test- tube, add a few drops of acidified potassium manganate (VII) solution and warm the mixture.

Observations	Inferences
Acidified potassium manganate (VII) is decolorized // purple colour turns colourless√**1**	R-OH present√**1**

(1 mark)	(1 mark)

d)To a little amount of Z, add sodium carbonate.

Observations	Inferences
No effervescence//no bubbles√**1**	R-COOH absent or H^+ (H_3O^+) absent√**1**
(1 mark)	(1 mark)