KAPSABET HIGH SCHOOL

233/3 - CHEMISTRY - Paper 3
(PRACTICAL)

2½hoS

MAKING SCHEME

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	22	
2. PART (I).	10	
3. PART (II).	08	
TOTAL SCORE	40	

1. Procedure A

Table 1

Award a total of 5mks distributed as follows:-

(a) Complete table 1mk

(i) Complete table with 3 titration done 1mk

(ii) Incomplete table with 2 titration done ½ mk

(iii) Incomplete table with only one titration done 0mk

Penalties

- Wrong arithmetic/substraction
- Inverted table
- Burette reading beyongd 50.0cm^3
- Unrealistic titre value i.e below 1.0cm^3

NOTE: Penalise ½ mk for EACH to a maximum penalty of ½ mk.

(b) Use of decimals (Tied to the 1st and 2nd row only) 1mk

(i) Accept either 1 or 2 decimals used CONSISTENTLY, otherwise penalize fully.

(ii) If 2 decimals places are used the 2nd decimal place must be a O or 5 otherwise penalize FULLY.

(c) Accuracy 1mk

Compare candidates titre value with the school value (SV)

Conditions

(i) If at least one value is within ± 0.1cm^3 1mk

(ii) If NO value is within ± 0.2cm^3 of SV but at least one is within ± 0.2cm^3 of SV ½ mk

(iii) If NO VALUE is within ± 0.2cm^3 of SV 0mk

(d) Principle of averaging 1mk

Values averaged must be shown and must be within ±0.2 of each other.

NOTE:

(i) If 3 values are possible but only 2 are averaged 0mk

(ii) If 3 titration are done, are in consistent and yet averaged 0mk

(iii) If only 2 titrations are done, are inconsistent and averaged 0mk

Penalties

(i) Penalise ½ mk for wrong arithmetic if error is outside ± 2 units in the 2nd decimal place.

(ii) Accept rounding off of answer to 2 decimal place, otherwise penalize ½ mk for rounding

to 1 decimal place or to a whole number where 2 or more decimal places were

obtainable.

NOTE: Accept answer if it works out exactly to 1 decimal place to a whole number.

(e) Final answer (tied to correct average titre)

Compare the candidates CORRECT AVERAGE TITRE with school value SV

(i) If it is within ±0.1cm^3 of SV 1mk

(ii) If it is not within ±0.1cm^3 of SV but it is within ± 0.20cm^3 of SV ½ mk

(iii) If it is beyond ±0.20cm^3 of SV 0mk

SUMMARY

Complete table	CT	1
Decimals	DEC	1
Accuracy	AC	1
Principles of averaging	PA	1
Final answer	FA	1
Total marks A		5mks

Procedure

CALCULATIONS

A (ii)

RFM of K_2CO_3 = (39x2)+12+(16x3)

= 138

Conc. Of solution P = $\frac{5.56}{138}$ = 0.040289855

≅ $0.0403 moldm^{-3}$

Conditions/ Penalties

(i) 5.56 must be transferred intact, otherwise penalize and award NO MARK for the final answer if a "strange" figure is used.
(ii) Accept round off answer to 3 decimal places, otherwise penalize ½ mk
(iii) Ignore arithmetic error if within ±2 unit in the 3rd decimal place, otherwise penalize ½ mk for wrong answer
(iv) Units may not be shown, but if shown MUST be correct, otherwise penalize ½ mk for wrong units.

A (iii) FIRST PRINCIPLES

Moles of K_2CO_3 used

= answer (ii) x 25✓ ½

1000

Ratio 1:1

Moles of Acid used = Ans(ii) x 25✓ ½

1000

Concentration of acid in solution P

= Ans (ii) x 25 x 1000✓ ½

1000 titre

= correct answer ✓ ½

$\frac{M_AV_A}{M_BM_B} = \frac{1}{1}$ ✓ ½

= M_A = Answer (ii) x 25 ✓ ½

Titre

= Correct answer✓ ½

A (iv)

Concentration of acid in solution P

= Answer (ii) x 10✓ ½

= Correct answer ✓ ½

Or

Answer (iii) x 250✓ ½

25

= Correct answer✓ ½

Or $M_PV_P = M_QV_Q$

= answer (iii) x 250✓ ½

25

= Correct Answer ✓ ½

NOTE: (i) Accept the concept of Dilution but the marking point is where answer (iii) is multiplied by the dilution factor.

Conditions

(i) For wrong transfer of answer (iii) penalize ½ mk otherwise for strange figure used penalize fully.
(ii) Answer MUST be as expected, otherwise penalize ½ mark for wrong answer
(iii) Accept rounding off answer to at least 3 decimal places, otherwise penalize ½ mk
(iv) Penalize ½ mk for wrong answer if the arithmentic error is outside ±2 units in the 3rd decimal place.
(v) Units may be given, but if given MUST be correct, otherwise penalize ½ mk for wrong units used.

B PROCEDURE

Table 2 (4mks)

Award a total of 4 marks distributed as follows

(a) Complete table 1mk

Penalties /conditions

(i) Penalise ½ mk ONCE for any space not filled subject to at least 5 readings being given otherwise penalize fully
(ii) Penalize ½ mk ONCE FOR UNREALISTIC temperature reading (less than 10^0C or greater than 40^0C) as initial temperature.
(iii) If temperature readings are ALL constant, penalize ½ mk on complete table.

(b) Use of decimals 1mk

Accept temperature readings and award 1mk ONLY IF CONSISTENTLY given either as whole number or to 1 decimal place, otherwise penalize fully.

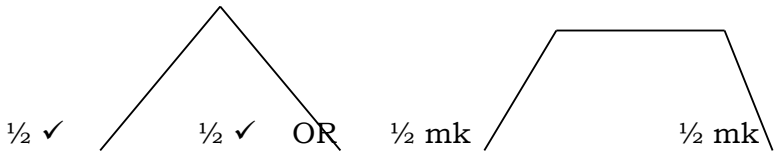
NOTE: the decimal place has either to be 0 or 5

(c) Accuracy 1mk

Compare the candidates FIRST initial temperature reading with the school value (SV) if within ±2.0, award 1mk otherwise penalize FULLY.

(d) Trend 1mk

Accept a continuous rise in temperature values up to a maximum for ½ mk. Followed by a continous drop in the values for another ½ mk.



B GRAPH (1) (Award of TOTAL of 3 marks distributed as follows.

I. Labelling of axis ½ mk

Award ½ mk ONLY if both axes are correctly labelled (i.e temperature vertical axis volume horizontally)

Penalties:- Penalise FULLY for inverted axes Penalize FULLY if wrong units are used otherwise ignore if units are omitted/ not used.

Penalize fully if only one axis is correctly labelled.

II. SCALE ½ mk

Conditions

(i) Area covered by plots should be at least 4 ½ of big squares on both horizontal and vertical axes.
(ii) Scale intervals MUST be consistent
NOTE: Penalise fully if any of the above conditions is not met.

III. PLOTTING 1mk

(i) If 6 to 7 points correctly plotted award 1mk

(ii) If 4 to 5 points correctly plotted award ½ mk

(iii) If lesss than 5 points correctly plotted award 0mk

(iv) If scale interval changes, mark plots (if any) with the first scale interval and treat the rest of the plots are wrong.

IV. THE LINE1mk

(i) Accept 2 straight lines intersecting on extrapolation for 1mk
(ii) Accept 2 straight lines not extrapolated (wheteher joined or not) for ½ mk

B. (ii)

I. Maximum change in temperature = ΔT ✓ 1mk

Conditions

(i) Accept the correct value of ΔT from an extrapolated graph with or without showing for 1mk
(ii) Award ½ mk for correct showing on an EXTRA POLATED graph if reading for ΔT is wrong or missing.
(iii) Award no mark where reading is given for graph not extrapolated.

II Volume of solution T = V cm^3 1 mk

CONDITIONS

i) Accept the CORRECT reading of V, with or without showing on an EXTRAPOLATED graph for 1mk.
ii) Penalize ½ mk for wrong units, otherwise ignore if units are omitted.
iii) Penalize FULLY for any reading of V given from a graph not extrapolated

B iii) I

Moles of Acid P = $\frac{Ans\ A(iv)\ x\ 25}{1000}$ ✓ ½

= Ans(iii) I✓ ½

CONDITIONS

i) Accept answer given to at least 4 decimal places,otherwise penalize ½ mk
ii) Penalize ½ mk for wrong transfer of AnswerA(iv).

iii) Units may not be shown but if shown must be correct, otherwise penalize ½ mk for wrong units

B iii) II

Heat evolved = MCΔT

NB: Award ½ mk for Answer B(ii) II + 25 X 4.2 x ΔT✓ 1mk

Converting volume to mass = Answer A✓ ½

Award ½ mk for expression.

Therefore molar heat of neutralization

$$= \frac{Answer\ A\ X\ 1}{Answer B(iii)\ I 1000} \checkmark \text{ 1mk}$$

= Correct Answer ✓ ½

OR

Molar heat of neutralization

$$= \frac{Answer B(ii)\ II + 25\ x}{Answer\ B(iii)\ I} \Delta T \quad \frac{1}{1000} \checkmark 2\ ½$$

½ mark for conversion of volume to mass 2 mks for expression

= Correct. Answer✓ ½

NOTE

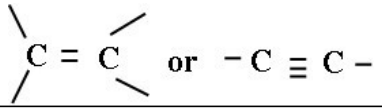
i) Accept the correct transfer of ΔT even if rejected at B(ii) I, unless it was rejected as 'Strange".
ii) Penalize ½ mk for wrong transfer of Ans B(ii) I or ΔT or both.
iii) Accept answer given to atleast 1 decimal place, Otherwise penalize ½ mk
iv) Penalise ½ mk for wrong units or if not shown.
v) Accept the use of abbreviation i.e. KJ/mole or $KJmol^{-1}$, KJ/mol. Or $KJmol^{-1}$.
vi) Negative sign expected on the "final answer" otherwise penalize ½ mk if omitted.
vii) Where the division by 1000 is Not shown or implied , penalize ½ mk on the "final answer"

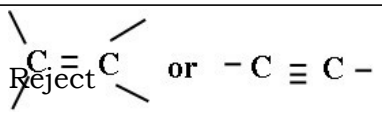
NOTE: For all the calculation, penalize fully if the candidate continues working Beyond the expected answer.

Total – 22MKS

2a)

Observation	Inference.
a) Solid dissolves to form a colourless√ 1 solution.	Soluble salt √ 1mk
i) White precipitate √ ½ soluble in excess √ ½	Al^{3+}, Pb^{2+} , Zn^{2+} √ (*3 ions – 1mk, 2 ions - ½ mk, 1 ion – Omk* *Penalize full for contradictory ion)*
ii) White precipitate √ ½ insoluble in excess √ ½	Al^{3+}, Pb^{2+} √ (*2 ions - 1mk, 1 ion - ½ mk*)
iii) No white precipitate √ ½	Al^{3+} confirmed √ Or Pb^{2+} absent. *Reject if not mentioned in a(i) and (ii) above.*

3a)Observation	Inference
Melts into colourless liquid. ✓ 1mk Burns with a smoky/sooty flame *NB: Unsaturated tied to sooty and smoky*	Unsaturated organic compound. <u>Accept</u> 1. A long chain hydrocarbon 2. High- carbon – hydrogenation Drawings✓ 1mk 

b) Bromine water decourized/ yellow bromine water turns colourless. ✓ 1mk *Reject: Brown for colour of bromine*	 Reject Carbon to carbon double bond or triple bond. *Penalize fully for any contradictory function group.*
c) Orange colour of acidified $K_2Cr_2O_7$ is retained/ acidified K_2 Cr_2O_7 of does not turn into green Reject yellow colour for $K_2Cr_2O_7$	Absence of ROH. ✓ 1mk Penalize fully for any for any contradictory
d) Effervescence / bubble of a gas / Fizzing✓ 1mk	functional group e.g. RCOOH Presence of H^+/RCOOH. ✓ 1mk TOTAL 8mks