

FORM FOUR CLUSTER KCSE MODEL 1

CHEMISTRY PAPER 3 ANSWER

1. Procedure 1

Table 1 4mks

A. COMPLETE TABLE1mk

Penalties and conditions.

(i) Penalize $\frac{1}{2}$ mk once for any space not filled subject to at least four readings given, otherwise penalize fully (award 0 mark)

(ii) Penalize $\frac{1}{2}$ mk once for unrealistic temperature readings i.e. less than 100 or above 400 at $t=0$

(iii) Penalize $\frac{1}{2}$ mk once if the temperatures readings are all constant.

B. USE OF DECIMALS..... 1mk

Conditions

(i) Decimals must be consistently recorded to either a whole number or to one decimal place.

(ii) If one decimal place is used then, it can either be 0 or 5, otherwise award 0 mks

C. ACCURACY..... 1mk

(i) Compare the candidates first temperature reading i.e. at time=0 seconds with the school value.

(ii) If within $\pm 2^\circ$ award 1 mark otherwise penalize fully (award 0 mark)

D. TREND1 mk

(i) Award one mark for continuous rise, followed by a constant then a drop.

(ii) Award one mark for continuous rise followed by a constant.

(iii) Award 1 mk for a continuous rise to maximum followed by a continuous drop.

(iv) Award zero mks if all readings are constant.

(v) Award 0 mks if there is a continuous drop only.

GRAPH..... 3mks

A. Labelling of axes $\frac{1}{2}$ mk

(i) Award $\frac{1}{2}$ mk only if both axes are correctly labelled. Penalties,

(i) Penalize fully for inverted axes.

(ii) Penalize fully for wrong units used, otherwise ignore if units are omitted.

(iii) Penalize fully if only one axis is labelled.

B. SCALE..... ½

Conditions:

- (i) Area covered by the plots should be at least half of the grid provided.
- (ii) The scale interval MUST be consistent on each axis.
- iii) Award for correct scale if the axes are inverted.

C. PLOTTING 1mk

Conditions.

- (i) If 7 or 8 plots are correctly plotted..... 1mk
- (ii) If 4 or 6 plots are correctly plotted ½ mk
- (iii) If less than 4 plots are correctly plotted 0 mk

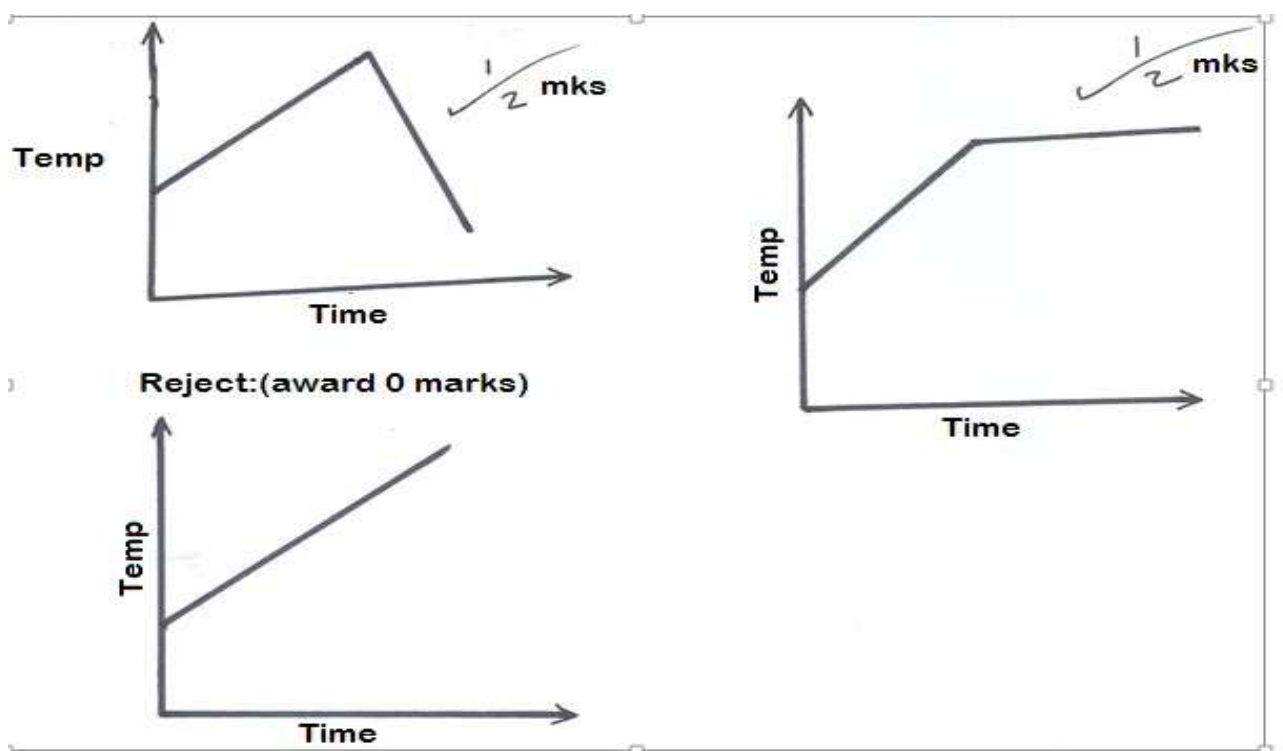
NOTE: Accept correct plots even if the axes are inverted and award accordingly.

D. SHAPE..... 1mk

Conditions.

- (i) Accept two straight lines intersecting on extrapolation with the first line passing through the initial temperature for one mark. (N/B The line MUST pass through plot $t=$) for of 1 mk)

Accept the following shapes for ½ mk



(b) –Correct reading from the correct graph $\sqrt{1/2}$

– ΔT = Highest temperature –temperature at time =0 $\sqrt{1/2}$

graph MUST be correctly extrapolated if no extrapolation award 0 mks

(c) $\Delta H = MC\Delta T \sqrt{1/2}$

$50 \times 4.2 \times \Delta T = \text{Correct answer}$

or $50 \times 4.2 \times \text{Answer (b)} = \text{Correct answer} \sqrt{1/2} \sqrt{1/2}$

NOTE: Answer in (b) MUST be transferred intact

$\frac{\text{Answer in (c)}}{464} \times \frac{1}{2} = \text{Correct answer} \sqrt{1/2}$

NOTE

Otherwise ignore if not given. (ii) In calculation (c) and (d) the answers MUST be transferred intact, otherwise award 0 marks for storage value and penalize $\frac{1}{2}$ mk for wrong transfers.

PROCEDURES 2

Table 2.....5 mks

A. Compete table 1 mk

Conditions:

(i) Complete table with 3 titrations done 1 mk

(ii) Incomplete table with 2 titrations done $\frac{1}{2}$

(iii) Incomplete table with 1 titrations done 0mk

Penalties

(i) Wrong arithmetic/subtraction (ii) Inverted table (iii) Burette reading beyond 50 cm³ unless explained.

(iv) Unrealistic titre/titres i.e less than 1 cm³

NOTE:

Penalize $\frac{1}{2}$ mk for each once up to a maximum of $\frac{1}{2}$ mk

B. USE OF DECIMALS..... 1 mk

Tied to the 1st and 2nd rows only in the titration table)

Conditions.

(i) Accept one or two decimal places used consistently otherwise penalize fully (award 0 mark)

(ii) If two d.p are used then the 2nd decimal place MUST be 0 or 5. Otherwise penalize fully.

(iii) Accept inconstancy in the use of zeros as initial burette readings i.e. 0, 0.0, 0.00 C.

ACCURACY..... 1mk

Complete candidate's correct titre value with the school value.

Conditions

- (i) If at least one is within ± 0.1 1mk
- (ii) If any of the titre value is within ± 0.2 ½ mk
- (iii) If no titre value is within ± 0.20 of school value... 0 mk

D. PRINCIPLES OF AVERAGING0mk

- Conditions:** (i) If three consistent titre values are averaged..... 1mk
- (ii) If three titrations are done but only two are consistent and are averaged 1mk
- (iii) If only two titrations are done and are consistent and averaged.....1 mk
- (iv) If three titrations are done, are inconsistent and averaged 0 mk
- (v) If three titre values are possible and only two are done, and are inconsistent and averaged.... 0mk
- (vi) If only one titration is done... 0mk

Penalties

- (i) Penalize ½ mk if no working is shown but answer given shown but given is correct.
- (ii) Penalize fully if no working is shown and the answer given is wrong
- (iii) Accept rounding off/truncating of answer to 2 d.p otherwise penalize ½ mk for rounding off to one d.p or to a whole number.

NOTE: Accept answer if it works out exactly to 1 d.p or to a whole number and credit accordingly.

E. FINAL ACCURACY. (Tied to the correct average titre)

- Compare the candidate's correct average titre with the school value.

- (i) If within ± 0.1 of school value1mk
- (ii) If within ± 0.2 of school value..... ½mk
- (iii) If beyond

± 0.2 of school value.....0mk

PROCEDURE TWO CALCULATIONS

(f) (i) $\frac{0.1 \times 25}{1000} = 0.0025 \text{ moles } \sqrt{\frac{1}{2}} \sqrt{\frac{1}{2}}$

(ii) Mole ratio of NaOH: HCl = 1:1 $\sqrt{\frac{1}{2}}$ Moles = Answer (f) $\sqrt{\frac{1}{2}}$

(iii) $\frac{250 \times \text{Answer (ii)}}{\text{Average titre}} \sqrt{\frac{1}{2}} = \text{Correct answer } \sqrt{\frac{1}{2}}$

(iv) Answer (iii) + Answer (d) procedure I = Correct answer $\sqrt{\frac{1}{2}}$

(v) $\frac{\text{Answer (iv)} 100}{50} \sqrt{\frac{1}{2}} = \text{Correct answer } \sqrt{\frac{1}{2}}$

NOTE: (

i) Penalize $\frac{1}{2}$ mark for wrong units given in parts f (i) to (v) otherwise ignore if not given

(ii) Answers should be given to at least four decimal places in parts f(i) to f(v), unless they work out exactly, otherwise penalize $\frac{1}{2}$ mark for rounding off to less than 4 decimal places (iii) Penalize $\frac{1}{2}$ mk if answer in (v) is unrealistic i.e. should be between 0.75 M and 1.5M

2. a)

Observations	Inferences.
(i) -White residues $\frac{1}{2}$ -Colourless filtrate. $\frac{1}{2}$	-Coloured ions absent ($Fe^{2+}, Fe^{3+}, Cu^{2+}$) NOTE: Reject coloured ions absent only, without mentioning of the ions. 2 Accept salt /slightly soluble for $\frac{1}{2}$ mk
(ii) -White ppt $\sqrt{\frac{1}{2}}$ -Soluble in excess	$Zn^{2+}, Pb^{2+}, Al^{3+} \checkmark$ NOTE: 3 ions mentioned..... 1 mk 2 ions..... $\frac{1}{2}$ mk 1 ion 0mk Accept ions written in words
(iii) -White ppt $\sqrt{\frac{1}{2}}$ -soluble in excess $\sqrt{\frac{1}{2}}$	$Zn^{2+} \checkmark \frac{1}{2}$ NOTE: Zn^{2+} ions must be mentioned in a (ii) above to be credited.
(iv) No effervescence $\sqrt{\frac{1}{2}}$ /No bubbles/ No fizzing. NOTE: Reject hissing, fizzling	$SO_4^{2-} \checkmark \frac{1}{2}$ present A ward $\frac{1}{2}$ mark for CO_3^{2-}, SO_3^{2-} absent
(v) -White ppt $\sqrt{\frac{1}{2}}$ -Insoluble in Nitric (V) acid ACCEPT: No bubbles/effervescence when nitic acid is added.	$SO_4^{2-} \checkmark \frac{1}{2}$

b)

Observations.	Inferences.
(i) -Effervescence $\sqrt{\frac{1}{2}}$ /bubbles/fizzing. REJECT: fizzing/hissing. Or Solid dissolves in Nitric (V) acid/colourless solution formed for $\frac{1}{2}$ mk	$CO_3^{2-}, SO_3^{2-} \checkmark \frac{1}{2}$ ACCEPT: for $\frac{1}{2}$ mk if only one ion is mentioned as present
(ii) -White ppt $\sqrt{\frac{1}{2}}$ -Soluble in excess $\sqrt{\frac{1}{2}}$	$Pb^{2+}, Zn^{2+}, Al^{3+} \checkmark 2$ 3 ions 1 mk

	2 ions.....½mk 1 ion..... 0mk
(iii) –White ppt √½ –Insoluble in excess√½	Pb^{2+}, Al^{3+} √1 NOTE: Must have been mention in b (ii) above to be credited.
(iv) –White ppt √½	Pb^{2+} √½ A ward ½ mark for Al^{3+} ions absent. Treat Ba^{2+}, Ca^{2+} as contradicting and penalize fully
NOTE(i) Penalize ½ mark for every contradicting ions to a maximum of 1 mark in a(ii) – b(iii) (ii)Penalize fully for any contradicting ion in a(v) and b(iv)	

3.

Observations	Inferences.
(a) –Burns with a yellow/sooty smoky flame/luminous flame√½	$\begin{array}{c} \\ C=C \\ \end{array} / - \underline{C} \equiv \underline{C} -$ Reject(i) $C=C$ (ii) $C \equiv C$ Functional groups written in words.
(b) Acidified potassium <u>Manganate</u> (VII) is decolourised.√1	$\begin{array}{c} \\ C=C \\ \end{array} / - \underline{C} \equiv \underline{C} -$ R – OH present Award ½ mark for R – OH alone and the other ½ mk for $\begin{array}{c} \\ C=C \\ \end{array}$ or $- C \equiv C -$
(c) pH= 4√½ OR pH =5	Solution is √½ Weakly acidic -1 Reject: Weak acid
(d) Effervescence√½/bubbles /fizzing. Reject: hissing /fizzling. NOTE: Penalize fully for any contradicting functional group in all the parts (a) to (b)	$H^+ / R-COOH / H_3O^+$ $\begin{array}{c} O \\ \\ -C- OH \end{array}$ Accept : - COOH, Reject: COOH.