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CHEMISTY PAPER 3

Marking scheme 2022

PRACTICAL

LAIKIPIA EAST TERM 2 2022 FORM 4 EVALUATION EXAM
Kenya Certificate of Secondary Education – K.C.S.E

1 **Table I**

	I	II	III
Final burette reading (cm^3)	12.0	24.2	12.1
Initial burette reading (cm^3)	0.0	12.0	0.0
Volume of acid used (cm^3)	12.0	12.2	12.1

SUMMARY

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

The marks are to be distributed as follows.

*a) **Complete table ……………………….   1 mk***
   (i) Complete table with 3 titrations done   award……………… 1 mk

  (ii) Incomplete table with 2 titrations done award……………..   1/2 mk

 (iii) Incomplete table with 1 titration done award………………   0 mk

Penalties

- Wrong arithmetic
- Inverted table
- Burette readings above 50cm^3 unless explained
- Unrealistic titre values i.e. values in hundreds or below 1.0cm^3
  Penalize ½ marks for each to a maximum of ½ marks i.e. penalize ½ mark once.

 b) Use of decimals …………………………………………….   (1 mk)

(i)   Accept only 1 or 2 decimal places used consistently otherwise penalize FULLY and award 0 mark .

(ii)   If the two decimal places are used the 2nd decimal place must be either "0" or "5" otherwise penalize fully.

(iii) Accept inconsistency in the use of zeros as initial burette reading e.g. 0.0, 0.00 or 0.000.
          NB decimal place tied to 1st and 2nd rows only.

c) **Accuracy** ……………………………………. **(1 mk)**

Compare the candidate's titre values with the teacher's value.

Conditions

(i) If at least one of the correct titre values is within $\pm0.1cm^3$ of the teachers value award………………………………….. (1 mk)

(ii) If no value is within ±0.1 of teachers value but at least one is within ±0.2 of teachers value award………………………….. ½ mk

d) Principle of averaging ……………………………………… **(1 mks)**

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

  Conditions

 (i) If 3 consistent titrations are done and averaged award………………….. (1 mk)

 (ii) If 3 titrations are done and ONLY two are consistent and averaged award (1 mk)

(iii) If only two titration's are done are consistent and averaged award (1 mk)

(vi) If three titres are possible but only two are averaged award (0 mk)

(v) If 3 inconsistent titres are averaged award (0 mk)

(vi) If only 2 titration's are done are inconsistent and averaged award (0 mk)

(vii) If only 1 titration is done award ……………………………………… (0 mk)

e) Final answer…………………………………………………………….. **(1 mk)**

 Compare the candidate's correct average titre with the teacher's value.

(i) If within ±0.1 of teachers value award ……………………………… (1 mk)

(ii) If not within ±0.1 of teacher's value but within ±0.2 award (1/2 mk)

(iii) If beyond ±0.2 f teacher's value award ……………………………… (0 mk)

CALCULATIONS

(a) $\underline{12.0 + 12.2 + 12.1}$ **(1/2mk)= 12.1cm^3(1/2mk) (MARKS ON THE TABLE)**
$$3$$

(b) $\underline{\textbf{0.5x 12.1(Ans a)}}$ **= 0.00605 moles(Ans b)**
$$\textbf{1000}$$

(c) Mole ratio $Ca(OH)_2$: HCl

1:2   (1/2mk)

Moles of D= $\underline{\textbf{0.00605(ans b)}}$ **(1/2mk)= 0.003025moles (ans c)(1/2mk)**
$$\textbf{2}$$

(d) $\underline{\textbf{0.003025(ans c) x 90}}$ **= 0.01089moles (ans d)**
$$\textbf{25}$$

e) $\underline{\textbf{0.01089 (ans d) x 74}}$ **= 0.806g (ans e)   (1mk)**

(penalizes ½ Mk for a value not within the range (0.6-1)g).

f)) $\underline{0.806(ans\ e) \times 100} = 0.895g/100g$ of water (ans f)

      90

g) $\underline{0.806(ans\ e) \times 100\%} = 80.6\%(ans\ g)$

    1

2. Table III

Time in minutes	0	1	11/2	2	21/2	3	31/2	4	41/2
Temperature in ^0C	20	20	20	20		27.5	26.5	25	23..5

Time in minutes	5	51/2	6	61/2	7
Temperature in ^0C	22.5	21.5	20	20	20

                                    (3 mks)

Complete table (CT)   1

    Decimals (DEC)   1/2

    Accuracy (AC)   1

    Trend   (T)   1/2

       Total marks   ***3mks***

The marks are to be distributed as follows.

a) Complete table ……………………….   ***1 mk***
      (i) Complete table with 13-14 expts done   award………………. 1 mk

 (ii) Incomplete table with 7-12 expts done award……………….. 1/2 mk

   (iii) Incomplete table with less than 7 expts done award…… 0 mk

 b) Use of decimals ………………………………………………….   **(1/2mk)**

   Accept only whole numbers/.0/.5/.00/.25/.75 used consistently,otherwise penalize FULLY and award 0 mark .

  c) Accuracy ………………………………….   **(1 mk)**

    Compare the candidate's time in t=1/2 with the teacher's value in t=1/2.

     Conditions

(iii)   If the value is within ± 1 of the teachers value award…   (1 mk)

(iv)   If THE value is within ± 2 of teachers value , award….(1/2MK)

d) TREND…………………………………   **(1/2 mks)**

The Values must be constant up to t=2 then continuously increase **(1/2mk)** followed by continuous drop/constant then continuous (**1/2mk).** Otherwise, penalize fully.

(a)GRAPH

Labeling axes (A)……1/2MK (correct labeling and units)

Scale   (S)…….1/2MK (uniform intervals that accommodate all the values)

Plotting   (P)…….1mk. (4/5 correct plots=1mk,3 correct plots=1/2mk,1 or 2correct plots=0mk)

Curve   (C)……..1mk (2 straight lines extrapolated to intercept t=21/2mins)

NB: IF Axes are inverted, award 0mk for labeling and mark the scale, plotting and curve accordingly.

(b) *ΔT = Final temp – Initial temp*

Shown from the correct curve =1/2mk, correct value=1/2mk.Not shown but correct value given=1/2mk.

c) *ΔH = mCΔT*

Enthalpy change= 100×4.2×Temperature change(ans b). $\sqrt{}$1/2MK

= ans c)…$\sqrt{}$1/2MK **(PENALISE 1/2MK FOR WRONG UNITS GIVEN BUT IGNORE IF MISSSING)**

(d) **<u>56</u>**   **(1/2mk)=**   **(Ans d) (1/2mk)**
   (ans c/1000)

NaOH : H_2O=1:1 (1/2MK)

Moles of NaOH =ans d (1/2mk)

(e))   **<u>1000x ans d</u> = (ans e)**
        40
     (PENALISE 1/2MK FOR WRONG UNITS GIVEN BUT IGNORE IF MISSSING)

	observations	inference
3. (a)	• Colourless liquid condenses at coller parts of test tube(1mk) • colourless Gas evolved turns red litmus blue(1/2mk) and blue litmus remain blue(1/2mk) • A white residue remain • REJECT: colourless water/water droplets	• Hydrated salt(1/2mk) (tied to colourless liquid) • NH_4^+ ions(1/2mk) (tied to red turns blue)

	Any 2 (1mk)	
(b)	• Solid dissolves (½ mk) to form a colourless solution (½ mk)	Soluble substance(1mk) coloured ions absent. (1/2mk) OR Mg^{2+} $AI3+$ $Ba2+$,$Pb2+$ $Zn2+$ $Ca2+$ Present (1/2mks)
(i)	white precipitate(1/mk) insoluble(1/2?mk)	Mg^{2+} AI^{3+} Pb^{2+} Present (1mk) Any 3 ions – (1mk) 2 ions (½ mk) 0 mk for any only one ion OR $Zn2+$ absent (1/2mk) Penalize the (½mk) to a maximum of1mk for any contradictory ion.
(ii)	NO yellow precipitate formed (1mk)	Mg^{2+} AI^{3+} $Ba2+$,$Pb2+$ Present (1mk) (1/ 2 each) OR Pb^{2+} **ABSENT** (½ MK)
(iii)	White precipitate (½ mk) does not dissolves (½ mk)	Mg^{2+} (1mk) OR $AI3+$ $Ba2+$ Ba absent (1/2mk)
(iv)	No effervescence /no bubbles of a colourless gas(1 mk)	CO_3^{2-}, SO_3^{2-}, HCO_3^- absent Any two ions award (½ mk each) Penalize the (½mk) for any contradictory ion to maximum of 1mk. OR $SO42-$, $Cl-$ Any two ions award (½ mk each) Penalize the (½mk)
(v)	white precipitate formed (1 mk)	$SO42-$, $Cl-$ Any two ions award (½ mk each) Penalize the (½mk) for any contradictory ion to maximum of 1mk.
(vi)	white precipitate formed (1 mk)	SO_4^{2-}