**GATUNDU SOUTH JOINT EXAM Kenya Certificate of Secondary Education**

**CHEMISTRY PAPER 3 (Practical)**

JULY/AUGUST 2019

MARKING SCHEME

**PROCEDURE 1**

**TABLE 1 …………………………………………………………………………….. 5MARKS**

Award a total of 5mks distributed as follows: -

**A: Complete table**

1. Complete table with 3 titrations done. ------------------------------------- 1mk
2. incomplete table with 2 titrations done ------------------------------------- ½mk
3. Incomplete table with 1 titration done. ------------------------------------- 0mk

**PENALTIES**

1. wrong arithmetic/subtraction
2. inverted table
3. Burette readings beyond 50cm3, unless explained.
4. unrealistic titre values i.e. too low (˂1m3 or too high >100cm3)

NB: Penalise ½mk each to a maximum

**B: USE OF DECIMALS (Tied to the 1st and 2nd row) ----------------------- 1mk**

1. Accept 1 or 2 decimal places used CONSISTENTLY otherwise penalize fully.
2. If 2 decimal places used the 2nd decimal place MUST BE a ‘0’ or ‘5’ otherwise penalize FULLY.
3. Accept INCONSISTENCY in decimals for use of zeros as initial burette reading (e.g. 0, **0.0, 0.00)**

**C: ACCURACY -------------------------------------------------------------- 1mk**

 Compare the candidates correct titre values to school value (S.V.) and tick the chosen value where it earns a mark.

 **CONDITIONS**

1. If at least one value is within + 0.10cm3 of S.V. award -------------------------- 1mk
2. If no value is within + 0.10cm3 of S.V. but at least + 0.20cm3 of S.V. award ---- ½mk
3. If none of the values is within + 0.2 of S.V. award ------------------------- 0mk

**D: PRINCIPLES OF AVERAGING**

 **CONDITIONS**

1. If three consistent titrations done and averaged ------------------------------- 1mk
2. if 3 titrations done, but only 2 are consistent and averaged ---------------- 1mk
3. if only 2 titrations done are consistent and averaged ---------------------- 1mk
4. if 3 titrations done are consistent but only 2 averaged-------------------- 0mk
5. If 3 titrations inconsistent alone and averaged --------------------------- 0mk
6. If 2 inconsistent titrations done and averaged ---------------------------- 0mk

**PENALTIES**

1. Penalise ½mk for arithmetic in the answer
2. Penalize ½mk if no working is shown but answer is given correctly.
3. Penalize fully if no working shown and answer given is wrong.
4. Accept rounding off/truncation to 2nd decimal place e.g. 19.166 as 19.17 0r 19.16 otherwise penalize ½mk if answer is rounded off to whole number of 1 decimal place

**NOTE**

1. Accept answer if it works out exactly to whole number of one decimal place and credit fully.
2. the working of average volume MUST be marked before the mark for averaging is awarded in table I

**E: FINAL ACCURACY (Tied to the correct average titre) ------------- 1mk**

Compare the candidate’s correct average titre to the S.V.

1. If within + 0.10 of S.V. ------------------------------------------------------- 1mk
2. If not within + 0.10 but within + 0.20 of S.V. ------------------------ ½ mk
3. if beyond + 0.2 of S.V. -------------------------------------------------- 0mk

**NOTE**

(i) Where there are two possible correct average titre, use one which is closer to the S.V. and award accordingly

(ii) If wrong values are averaged, pick the correct values (if any) following principles of averaging and award accordingly.

**TABLE 1**







Calculations

(ii) Concentration of solution Q in moles/dm3

 25 x 1.99 = 250 x M2

M2 = 25 x 1.99 250

 = 0.199M

NB: 1.99 should be transferred intact.

(iii) Concentration of solution C in mole/dm3

 2 : 1

 25 x 0.199 x ½ x 1000 = Ans 1000 Titre

(iv) The R.F.M. of H2C2O4 x H2O

 25.2 = correct Ans Ans in (iii)

(v) The value of x in H2C2O4 X H2O

 2 + 12 + 4(16) + 18χ

 18χ = Ans (IV) – 90

= Ans (IV) – 90 18

 = correct Ans

**PROCEDURE II**

TABLE-------------------------------------------- 7 ½mks

Marking points

1. complete ------------------------------- 5mks

**PENALTIES AND CONDITIONS**

1. Penalize ½mk for each space not filled
2. Reject fractions for ½ and award a maximum of 2½mks for the table.
3. If fractions appear followed by an extra column of decimals, ignore the fractions and award accordingly.
4. If fractions appear followed by an extra column of decimals, ignore the fractions and award accordingly.
5. Penalize ½mk each for wrong arithmetic in reciprocal column not within an error of + 2 units in the 3rd decimal place, unless it divides exactly.
6. Accept reciprocals expressed in standard form or powers of 10.
7. Accept reciprocals given at least to 3 decimal places otherwise penalize 1.2mk each for rounding off to 2 d. places to a maximum of 1mk unless divides exactly.
8. Penalize ½mk for every time reading of t ˂ 5 or > 120 in the time column.
9. Penalize ½mk for each entry not in seconds (e.g. time in min)
10. Penalize ½mk for each entry in fraction in the reciprocal
11. **Use Of Decimals-------------------------- ½mk**

(Tied to time column alone)

Accept whole numbers of decimals used consistently otherwise penalize fully (up to 2nd decimal place only)

1. **Accuracy -------------------------------- 1mk**

Compare the candidates’ first reading to the S.V. If within + 2 seconds award 1mk otherwise penalize fully.

1. **Trends -------------------------- 1mk**

Award 1mk if time is increasing otherwise award zero.

|  |  |
| --- | --- |
| Time (sec) | $\frac{1}{t}$ sec |
| 30 | 0.033 |

**GRAPH (Q1b)**

Graph ------------------------------- 3mks

1. **scale ------------------------- ½mk**

Area covered by actual plots including the origin must be 4½ (χ axis) x 3½ (y-axis) big squares otherwise penalize fully.

Scale used should be consistent on both axis otherwise penalize fully. (Scale must accommodate all points) 3½

1. labelling axis ---------------------- ½mk

Conditions

1. Penalize ½mk for wrong units used.
2. Penalize ½mk for inversed axis.
3. accept if no units shown on the axis
4. **plot ------------------------------ 1mk**

(Tick each plots on the graph)

1. Accept 4 or 5 points correctly plotted for ----- 1mk
2. If 3 points are correctly plotted ----------------- 1mk
3. if 2 points are correctly plotted ------------------ ½mk
4. if 1 point is correctly plotted ------------------- 0mk
5. If scale interval changes mark points within the first scale interval and award accordingly.
6. Accept the correct point even if the scale axis are inverted.
7. If point in the table are to 3 or more decimals places and rounded off to 2 decimal places on plotting, penalize ½mk once otherwise accept rounding off to 3 decimal places.
8. **line -------------------------------------- 1mk**

Accept a straight line passing through at least 2 points correctly plotted through the origin (1mk) (check whether line will pass through the origin and award fully)

Otherwise zero

(i) Showing $\frac{1}{t}$ on graph ------------------------ ½mk

(ii) Stating the correct reading -------------------- ½mk

(iii) Expression t = $\frac{1}{correct reading}$

(iv) Correct answer

**CONDITIONS**

1. Penalize ½mk if showing on the graph is missing to obtain the value.
2. Award 1mk if shown on the graph and used correctly in the expression (missing TT)
3. Award 1mk if not shown on the graph and not recorded but used correctly in the expression (Missing (T) and (T.I)
4. Accept the answer at least to 1 decimal place unless it works exactly to a whole number.
5. Penalize ½mk for wrong arithmetic. If the answer is not within + 2 units in the 1st decimal place.
6. Award zero 0 if not shown on the graph and value stated and used in expression is wrong.
7. If the value is shown but stated wrongly penalize ½mk for reading but accept the subsequent working if done correctly.

Rate decreases with decrease in concentration of H2O2 ------------------ 2mks

Note tied to correct trend in table or correctly plotted graph.

**NOTES/ALTERNATIVES**

(i) If decrease in rate is related to decrease in volume of H2O2 award 1mk or vice versa.

(ii) If candidates proceed form (i) above to relate volume with concentration of H2 O2 then award 2mks.

(iii) If concentration is related to time award 1mk.

 But if time is related to rate award another 1mk.

2. (I)

|  |  |
| --- | --- |
| **Observations** | **Inferences**  |
| Light green solid turns brownColourless liquid/formOn cooler part/colourless vapourCondensing on the cooler parts of the test tube.Gas with pungent chocking/irritating smell.Blue litmus turns redRed litmus remains red**CONDITIONS**Reject any other initial colour of the solid apart from green.Reject any contradictory colour/of the gas. Penalize fully if brown start. No mark for inference. | Fe2+ presentHydrated salt/water of crystallization**CONDITIONS**Reject Fe2+ mix with other ions credit only if mixed with Fe3+State correct symbol and charge reject words. |

(b) (i)

|  |  |
| --- | --- |
| **Observations** | **Inferences**  |
| Dirty green ppt insoluble in excess.**CONDITIONS**Ignore ppt turns brown on standingAny other colour penalize fully | Fe2+ present(Fe2+ oxidized to Fe3+ ignore)Do not credit if not insoluble in excess |

 (ii)

|  |  |
| --- | --- |
| **Observations** | **Inferences**  |
| Yellow/brown/reddish solutionBrown ppt insoluble in excess**CONDITIONS**If green solution followed by brown ppt credit brown pptPenalize for brown ppt if green ppt is seen | Fe2+ oxidized to Fe3+**CONDITIONS**If Fe3+ appears alone credit ½mk |

(iii)

|  |  |
| --- | --- |
| **Observations** | **Inferences**  |
| Accept:White precipitate**CONDITIONS**Reject cloudy white solution | **CONDITIONS**Penalize ½mk for any contradictory ion.SO , SO or CO PresentIf all 3 credit ---------------------- 1mkIf all 2 credit ---------------------- ½mkIf 1 credit -------------------------- 0mk |

2.

|  |  |
| --- | --- |
| **Observations** | **Inferences**  |
| White precipitate**CONDITIONS**Accept ppt insoluble only if white ppt appear in (iii) INo observable change | SO presentCONDITIONTied to SO mentioned above. |

3. (a)

|  |  |
| --- | --- |
| **Observations** | **Inferences**  |
| Blue flameNon smoky flame | Saturated solution/low carbon/ C C / C = C C C - Absent |

(b)

|  |  |
| --- | --- |
| **Observations** | **Inferences**  |
| Liquids are miscible/No separation/no layerAccept: F dissolve in water* forms a solution
 | R-OH/Polar organic acidIgnore R - COOH |

(c)

|  |  |
| --- | --- |
| **Observations** | **Inferences**  |
| No effervescence/no bubblesNo fizzingReject : No hissing sound | H+ ion absentLiquid not acidIgnore R-COOHabsent |

(d)

|  |  |
| --- | --- |
| **Observations** | **Inferences**  |
| Solutions changes from Orange to green/acidified K2cr2O7 changes from orange to green | R – OH presentReject ÷ –OHAccept ÷ Alkanol present in wordsPenalize fully for any contradictory/functional group. |