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

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

PENALTIES

i. wrong arithmetic/subtraction
ii. inverted table
iii. Burette readings beyond 50cm^3, unless explained.
iv. unrealistic titre values i.e. too low (<1m^3 or too high >100cm^3)

NB: Penalise ½mk each to a maximum

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

i. Accept 1 or 2 decimal places used CONSISTENTLY otherwise penalize fully.
ii. If 2 decimal places used the 2nd decimal place MUST BE a '0' or '5' otherwise penalize FULLY.
iii. 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

a) If at least one value is within ± 0.10cm^3 of S.V. award ---------- 1mk
b) If no value is within ± 0.10cm^3 of S.V. but at least ± 0.20cm^3 of S.V. award ---- ½mk
c) If none of the values is within ± 0.2 of S.V. award ---------- 0mk

D: PRINCIPLES OF AVERAGING

CONDITIONS

i.	If three consistent titrations done and averaged ----------	1mk
ii.	if 3 titrations done, but only 2 are consistent and averaged ----------	1mk
iii.	if only 2 titrations done are consistent and averaged ----------	1mk
iv.	if 3 titrations done are consistent but only 2 averaged----------	0mk
v.	If 3 titrations inconsistent alone and averaged ----------	0mk
vi.	If 2 inconsistent titrations done and averaged ----------	0mk

PENALTIES

a. Penalise ½mk for arithmetic in the answer
b. Penalize ½mk if no working is shown but answer is given correctly.
c. Penalize fully if no working shown and answer given is wrong.
d. 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

i. Accept answer if it works out exactly to whole number of one decimal place and credit fully.
ii. 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.

i.	If within ± 0.10 of S.V. ----------	1mk
ii.	If not within ± 0.10 but within ± 0.20 of S.V. ----------	½ mk
iii.	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/dm^3

$$25 \times 1.99 = 250 \times M_2$$

$$M_2 = \frac{25 \times 1.99}{250}$$

$$= 0.199M$$

NB: 1.99 should be transferred intact.

(iii) Concentration of solution C in mole/dm^3

2 : 1

$$\frac{25 \times 0.199}{1000} \times \frac{1}{2} \times \frac{1000}{\text{Titre}} = \text{Ans}$$

(iv) The R.F.M. of $H_2C_2O_4 \times H_2O$

$$\frac{25.2}{\text{Ans in (iii)}} = \text{correct Ans}$$

(v) The value of x in $H_2C_2O_4 X H_2O$

$$2 + 12 + 4(16) + 18\chi$$

$$18\chi = \text{Ans (IV)} - 90$$

$$= \frac{\text{Ans (IV)} - 90}{18}$$

$$= \text{correct Ans}$$

PROCEDURE II

TABLE---------- 7 ½mks

Marking points

a) complete ---------- 5mks

PENALTIES AND CONDITIONS

i. Penalize ½mk for each space not filled
ii. Reject fractions for ½ and award a maximum of 2½mks for the table.
iii. If fractions appear followed by an extra column of decimals, ignore the fractions and award accordingly.
iv. If fractions appear followed by an extra column of decimals, ignore the fractions and award accordingly.
v. 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.
vi. Accept reciprocals expressed in standard form or powers of 10.
vii. 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.
viii. Penalize ½mk for every time reading of $t < 5$ or > 120 in the time column.
ix. Penalize ½mk for each entry not in seconds (e.g. time in min)
x. Penalize ½mk for each entry in fraction in the reciprocal

b) 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)

c) Accuracy ---------- 1mk

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

d) Trends ---------- 1mk

Award 1mk if time is increasing otherwise award zero.

sec)	

GRAPH (Q1b)

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

i. 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

ii. labelling axis ---------- ½mk

Conditions

a. Penalize ½mk for wrong units used.
b. Penalize ½mk for inversed axis.
c. accept if no units shown on the axis

iii. plot ---------- 1mk

(Tick each plots on the graph)

a. Accept 4 or 5 points correctly plotted for ----- 1mk
b. If 3 points are correctly plotted ---------- 1mk
c. if 2 points are correctly plotted ---------- ½mk
d. if 1 point is correctly plotted ---------- 0mk
e. If scale interval changes mark points within the first scale interval and award accordingly.
f. Accept the correct point even if the scale axis are inverted.
g. 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.

iv. 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

a. Penalize ½mk if showing on the graph is missing to obtain the value.
b. Award 1mk if shown on the graph and used correctly in the expression (missing TT)

c. Award 1mk if not shown on the graph and not recorded but used correctly in the expression (Missing (T) and (T.I)
d. Accept the answer at least to 1 decimal place unless it works exactly to a whole number.
e. Penalize ½mk for wrong arithmetic. If the answer is not within $\pm$ 2 units in the 1st decimal place.
f. Award zero 0 if not shown on the graph and value stated and used in expression is wrong.
g. 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 H_2O_2 ---------- 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 H_2O_2 award 1mk or vice versa.

(ii) If candidates proceed form (i) above to relate volume with concentration of H_2 O_2 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 brown Colourless liquid/form On cooler part/colourless vapour Condensing on the cooler parts of the test tube. Gas with pungent chocking/irritating smell. Blue litmus turns red Red litmus remains red **CONDITIONS** Reject any other initial colour of the solid apart from green.	Fe^{2+} present Hydrated salt/water of crystallization **CONDITIONS** Reject Fe^{2+} mix with other ions credit only if mixed with Fe^{3+} State correct symbol and charge reject words.

Reject any contradictory colour/of the gas. Penalize fully if brown start. No mark for inference.	

(b) (i)

Observations	**Inferences**
Dirty green ppt insoluble in excess. **CONDITIONS** Ignore ppt turns brown on standing Any other colour penalize fully	Fe^{2+} present (Fe^{2+} oxidized to Fe^{3+} ignore) Do not credit if not insoluble in excess

(ii)

Observations	**Inferences**
Yellow/brown/reddish solution Brown ppt insoluble in excess **CONDITIONS** If green solution followed by brown ppt credit brown ppt Penalize for brown ppt if green ppt is seen	Fe^{2+} oxidized to Fe^{3+} **CONDITIONS** If Fe^{3+} appears alone credit ½mk

(iii)

Observations	**Inferences**
Accept: White precipitate **CONDITIONS** Reject cloudy white solution	**CONDITIONS** Penalize ½mk for any contradictory ion. SO^{2-} , SO^{2-} or CO Present If all 3 credit ---------- 1mk If all 2 credit ---------- ½mk If 1 credit ---------- 0mk

2.

Observations	**Inferences**
White precipitate **CONDITIONS** Accept ppt insoluble only if white ppt appear in (iii) I No observable change	SO present CONDITION Tied to SO_4^{2-} mentioned above.

3. (a)

Observations	**Inferences**
Blue flame Non smoky flame	Saturated solution /low carbon/ — C C / C = C C C - Absent

(b)

Observations	**Inferences**
Liquids are miscible/ No separation/no layer Accept: F dissolve in water - forms a solution	R-OH/Polar organic acid Ignore R - COOH

(c)

Observations	**Inferences**
No effervescence/no bubbles No fizzing Reject : No hissing sound	H+ ion absent Liquid not acid Ignore R-COOH absent

(d)

Observations	**Inferences**
Solutions changes from Orange to green/acidified $K_2cr_2O_7$ changes from orange to green	R – OH present Reject ÷ –OH Accept ÷ Alkanol present in words Penalize fully for any contradictory/functional group.