SERIES 48 EXAMS

MARKING SCHEME

233/3 CHEMISTRY PAPER 3

TABLE I (7½marks)

1. Marks distributed as follows

a) COMPLETE TABLE (CT) (5marks)

(Complete the table with 10 readings.)

PENALTIES/CONDITIONS

i. Penalize ½marks for each space not filled (TICK OR PUT CROSS)

ii. Reject fractions for ⅟time and award a maximum of 2½marks for the time column (table)

iii. If FRACTIONS appear followed by an extra column of decimals IGNORE the fraction column and award accordingly.

iv. Penalize ½mark each for wrong arithmetic in the reciprocals not within an error of ±2units in the third decimal place (d.p) e.g.0.054, 0.056, and 0.058.

v. Accept reciprocals expressed in standard form or in the power of tens. E.g. 5.4×10^{-2}.

vi. ACCEPT reciprocals given to at least 3d.ps; otherwise penalize ½mark each to a maximum of 1mark for rounding off to 2d.ps. UNLESS the figure divides out exactly. E.g. 0.067 rounded to 0.07 is wrong.

vii. PENALISE ½marks for any TIME reading that is less than Five (<5) OR greater than 120 ($5 \leq t \leq 120$). In the time column BUT credit the reciprocals columns accordingly.

viii. Penalize ½marks for each for entry not in SECONDS in the time column.

ix. Penalize ½ marks for each entry in fractions in the reciprocal column if the candidate enters some readings in FRACTIONS and others in decimal.

b) USE OF DECIMALS (D) (½mark)

(Tied to time column only).

i. Accept whole numbers or 1d.p to 2d.p used CONSISTENTLY THROUGHOUT otherwise penalize fully.

c) ACCURACY (A) (1mark)

i. Compare the candidates FIRST READING with the school value (s.v)

ii. If the school value is with ±2 units of teacher's value award 1mark otherwise penalize fully.

d) TREND (T) (1 mk)

(Tied to the column only)

i. Award 1mark if time is INCREASING THROUGHTOUT otherwise penalize fully.

a) TABLE I

Experiment	Beaker 1			Beaker 2				
	Volume of water (cm^3)	Volume of hydrogen peroxide (cm^3) J	Volume of dilute sulphuric acid sln K (cm^3)	Volume of sodium thiosulphate solution L (cm^3)	Volume of potassium iodide solution M (cm^3)	Volume of starch solution . Solution N (cm^3)	Time (secs)	⅟time sec^{-1}
1	0	25	20	5	5	2	11	0.091
2	5	20	20	5	5	2	14	0.071
3	10	15	20	5	5	2	16	0.063
4	15	10	20	5	5	2	18	0.056
5	20	5	20	5	5	2	20	0.05

Breakdown of marks;

- CT – 5
- D - ½
- A – 1
- T – 1

TOTAL = 7½marks.

b) GRAPH **(4marks)**

Marks distributed as follows;

a) SCALE (S) (½mark)

i. Area covered by ACTUAL PLOTS including the origin should be half or more than half of the graph paper provided otherwise penalize fully.
ii. Scale must be consistent (linear) on both axes otherwise penalize fully.
iii. The candidates scale must accommodate all the five plots (S), otherwise penalize fully.

b) LABELLING OF AXES(A) (½mark)

i. Penalize ½marks for wrong units.
ii. Penalize ½marks for INVERTED axes.
iii. ACCEPT if NO UNITS are shown both axes.
iv. Both axes MUST be correctly labeled.
v. Accept if 1unit is correctly given.

c) PLOTTING (P) (2marks)

CONDITIONS;

i. Accept 4 – 5 points correctly plotted for 2marks
ii. Accept 3 points correctly plotted for 1mark
iii. If any two (2) points correctly plotted for ½mark
iv. If any 1point correctly plotted for 0marks

NOTE;

i. If scale interval changes, mark the correct points within the 1st interval and award accordingly.
ii. Accept correct plots even if the axes are INVERTED OR INTERCHANGED

iii. If the points for the table are to 3 d.p or more decimal places and rounded off to two 2d.p on PLOTTING, PENALISE ½mark once. Otherwise accept rounding off to 3d.p.

d) LINE (L) 1mark

i. Accept a straight line passing through at least two points (2points) CORRECTLY PLOTTED and through the origin. Otherwise penalize fully.
Breakdown for marks for Graph.

S - ½ mk
A - ½mk
P - ½mk
L - ½mk
Total 4mark

c) i) Showing on the graph ½mark.
ii) Stating correct reading on graph ⅟t ½mark.
iii) Expression for t = ⅟correct reading. ½mark.
iv) Correct answer for t ½mark.
Total 2marks.

CONDITIONS;

i. Penalize ½mark if not shown on the graph.
ii. Award 1mark if shown on the graph BUT not stated but used correctly in the expression i.e. t = ⅟correct reading
iii. Award 1mark **if not shown on the graph, not recorded, but** goes straight to the expression.
iv. Accept the answer at least to 1d.p UNLESS if it works out exactly to a whole number otherwise penalize fully (½mark)
v. Penalize ½mark for wrong arithmetic if answer is not within ±2 units in the 1st decimal places. (d.p)
vi. Award ZERO (0) if not shown on the graph and the stated value is wrong.
vii. If the value is shown on the graph, BUT stated wrongly penalize ½mark for wrong reading (stating) but accept the subsequent working if done CORRECTLY and award accordingly.
viii. Penalize ½mark if expression is not given but the answer is correct.

d) RATE DECREASES WITH DECREASE in the concentration of hydrogen peroxide OR vice versa (2mrks)

CONDITIONS;

i. The answer above must be related to either correct data from the table or correct graph.
ii. If decrease in rate is related to decrease in VOLUME of hydrogen peroxide OR VICE VERSA award 1mark.
iii. If candidates proceeds from (ii) above to relate correctly volume with. CONCETRATION of hydrogen peroxide then award fully (2marks).
iv. If CONCETRATION is related to time, only award only 1mark, BUT if the candidate proceeds to relate correctly time and rate then award another 1mark.

Total for question 1(one) 15 ½marks.

2. a)

i. Observation	Inference
No white ppt **Reject** • No observable change • No change • No ppt • No observable reaction • No colour change • No observation 1mark	Zn^{2+}, Pb^{2+}, Al^{3+}, Ca^{2+}, Mg^{2+} absent **CONDITION;** ▪ Any 3mentioned 1mark ▪ Any two mentioned ½mark. ▪ Any 1mentioned 0mark **NOTE;** • Ignore K^+, Li^+, Na^+, NH_4^+ if mentioned as present. • Ignore mention of Cu^{2+}, Fe^{2+}, Fe^{3+} if mentioned as absent. • For any contradictory ion; penalize ½mark and mark out of 1mark. 1mark
ii. Observation	Inference
No white ppt **Reject;** • No observable change • No change • No ppt • No observable reaction • No colour change • No observation 1mark	SO_4^{2-}, SO_3^{2-}, CO_3^{2-} absent. **CONDITIONS;** ▪ All three mentioned 1mark. ▪ Any two mentioned ½mark. ▪ Any one mentioned 0marks **NOTE;** • Penalize ½mark for contradictory ion for any other ion mentioned either cation or anion • Penalize ½mark for any ion not written correctly and treat it as contradictory to a maximum of 1mark. 1mark
iii. Observation	Inference
Brown solution/yellow solution. **Reject;** • Orange solution • Yellow/brown precipitate 1mark	Br^-, I^- present **CONDITIONS;** ▪ Two mentioned 1mark. ▪ One mentioned ½mark. **NOTE;** • Penalize ½mark for each contradictory ion to a maximum of 1mark. 1mark
iv. Observation	Inference

Brown solution/ black ppt **Reject;** Brown ppt Grey ppt 1mark	I^{-1} present **CONDITIONS;** ▪ Credit I^- ion even if it does not appear in (ii) above. PENALTY; • Penalize 1mark for any contradictory ion to a maximum of 1mark. 1mark
v. Observation	Inference
Yellow ppt **Reject ;** • Yellow solid • Yellow substance • Yellow particles • Yellow mass. 1mark	I^- present **NOTE;** Penalize 1mark for any contradictory ion. 1mark

Note;
All ions must be written with correct symbols and charge. For any wrong symbol of expected ions given, penalize ½mark and treat it as contradictory.

b) TABLE 2

i)

Solution	Colour of the flame
P	pale – green/light green/green√1
R	Violet/lilac/purple/blue√1
S	Yellow/orange/golden yellow√1
Q	Violet/lilac/purple/blue√1

4marks
NOTE;
REJECT;
Yellowish – green, greenish – yellow, bluish, pink.

ii) K^+

NOTE;

i) Penalize fully if the cation is written in words

ii) Penalize fully if the cation is not correctly written e.g. k^+; using small letter instead of capital.

3.

a) Observations	Inference
Melts/colourless liquid forms Burns with smoky/sooty flame 1½marks	Unsaturated organic compound (Tied to burns with sooty/smoky flame) Or C = C OR C C present. Reject C = C / C C Penalize fully for any contradictory ion 1mark
b) i) Observations	Inference
• Acidified potassium manganate(vii) is decolourised OR • Acidified potassium manganate(vii) turns from purple to colourless **Reject;** ▪ Discolourized ▪ No observable change ▪ Turns from yellow to colourless 1mark	R – OH present IGNORE R – COOH if mentioned PENALTY Penalize fully for any contradicting ion. 1mark
ii) Observations	Inference
Bromine water not decolorized **Reject;** • Not decolorized • No observable change 1mark	√2 C = C C C √2 absent NOTE i) All mentioned 1mark ii) 1mentioned ½mark . Penalize full for any contradictory ion 1mark
iii) Observations	Inference
Effervescence/ bubbling √2 ½mark	H^+/R – COOH Reject-COOH 1mrk
ii) Observations	Inference
Blue litmus turns red Red/pink litmus remains red **Reject;** i. Turns red ii. Remains red iii. No change on red litmus paper 1mark	H^+/R-COOH present Reject • -COOH • Penalize fully for any contradictory ion 1mark