FORM FOUR

CHEMISTRY PAPER 3

MARKING SCHEME

Table 1

Volume of distilled water	**Temp ^{0}C**	**Salability of R in Y/100g of water**
4	76	125.00
6	70	83.33
8	59	62.50
10	51	50.00
12	40	41.66

Table 1 attracts 6marks distributed as follows.

(a)Complete table.....1mrk

- ✓ Award 1mrk for 5 – 4 correctly filled.
- ✓ Award ½Mrk For 3 Correct Readings.
- ✓ Award 0Mrk for less 3 readings.

(b)Accuracy.....½mrk

- ✓ Tied to the 1st temperature.
- ✓ Accept if within $+12.0^0$ C of school value.

(c) Decimal.....1mrk

- ✓ Accept whole number for temperature readings.
- ✓ Accept one decimal places of .5 or .0 for temperature readings.
- ✓ Penalize fully for decimal if not consistent.

(d) Trend.....1mrk

- ✓ Accent temperature readings drops continuously.
- ✓ Award ½ mrk if temperature reading all remain constant or rises
- ✓ Penalize fully if temperature readings all remain constant 2 ½ mk

(e) Solubility calculations.....1mrk

- ✓ Award 2 ½ marks for calculations of solubility.
- ✓ Award ½ mark for each correct calculation done.

Graph

Graph attracts three marks awarded as follows:

7(a) Labeling of axes ..... ½ mrk

- ✓ Award ½mk for all axes correctly labeled with correct units.
- ✓ Units may be given on both or not.
- ✓ If units given, they must be correct.

(b) Scale ..... ½mrk

- ✓ Graph should cover at least ½ of the space provided (area covered by plots)
- ✓ Scale should accommodate all plots whether plotted or not.

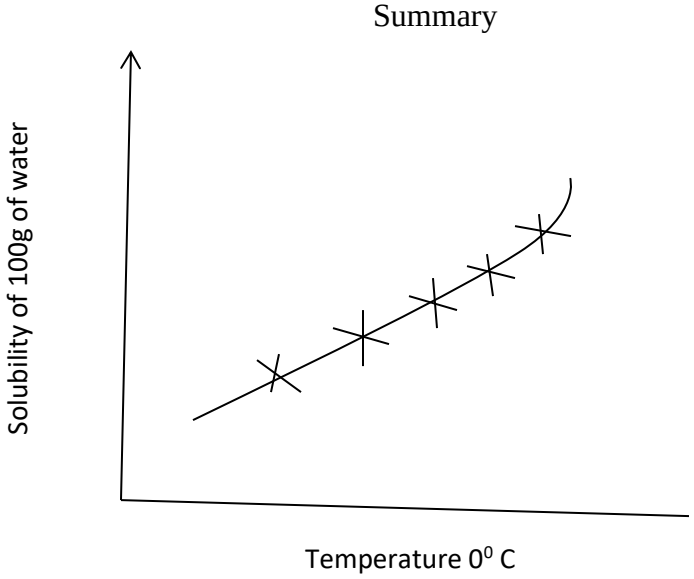
(c) Plotting 1mrk

- ✓ Award 1mrk for 4 – 5 plots are correctly plotted.
- ✓ Award ½mrk for 3 plots.
- ✓ Award 0mrk for less than 3 plots.

(d) Curve ..... (1mrk)

Award 1mrk for smooth curve drawn passing through correctly plotted plots.

Summary



(b) i) Should be shown from the graph ½ correct reading from correctly drawn graph ½ (both should apply)

E.g. 55^0C = 60g/100g water

ii) 40g ⟶ 50g

? ⟵ 100g

$\frac{40 \times 100}{50}$ = 80g/100g of water

Reading correctly at 80g/100g water = 66^0C

Table II

	I	II	III
Final burette reading (cm^3)	19.8	19.7	19.9
Initial burette reading	0.0	0.0	0.0
Volume of solution P used	19.8	19.7	19.9

Total of 5mks awarded as follows:

(a) Complete table 1mk

Awarded as;

- ✓ Complete table with three titration done 1mk
- ✓ Complete table with two titration done ..... ½mk
- ✓ Complete table with one titration done 0mk
- ✓ Penalize 1/2mk for wrong arithmetic's on complete table incomplete table or unrealistic burette readings

(b) Decimals ..... (1mk)

- ✓ Award 1mk if decimals are used consistently tied to 1st row and second row readings.
- ✓ Accept use of 0, 0.0, 0.00 on the initial burette reading. Incase of 2 decimals place the second decimal should be 0 or 5
- ✓ Penalize fully if decimals are used inconsistently.

(c) Accuracy ..... (1mk)

- ✓ Award 1mk if at least one of the readings is within $-^{+}0.2$ of school value.

(d) Principle of averaging ..... (1mk)

- ✓ Award 1mk if two or three consistent values are correctly chosen averaging that is within $-^{+}0.1$ or $-^{+}0.2$
- ✓ If all three values are with the range and only two are averaged then Penalize fully and award (0mk)
- ✓ If none of the values are within the range penalize fully, if averaged.

(e) Final Accuracy ..... (1mk)

- ✓ Award 1mk if within $-^{+}0.1$ 0f the school value
- ✓ Award ½mk if within $-^{+}0.2$ of the school value

Calculations

(a) Average volume of P $\frac{19.8 + 19.9 + 19.7}{3} = 19.8cm^3$

(b) Moles of Q

$\frac{0.25 \times 25\ ½}{1000} = 0.00625$Moles (½mk)

(c) Moles of P

Ans in (b) above divided by 2 = ans ½

E.g. $\frac{0.00625\ ½}{2} = 0.003125$Moles

NB answer in (b) above Mn of be transferred wholly otherwise penalize fully.

(d) Answer in $\frac{\text{(c) above} \times 1000\ ½}{\text{Average volume}}$ = ans ½

e.g. $0.003125 \times \frac{1000}{19.8} = 0.157$Moles

NB answer should should be to 4 decimals otherwise penalize ½mk

(e) Value of n

$5g \longrightarrow 250cm^3$ $\frac{5 \times 1000}{250} = 20$

$\longrightarrow 1000cm^3$

$\frac{20}{\text{ans in d above}} = \text{Molar mass}$

$n = \frac{\text{Molar mass} - 90}{18} =$ (ans in whole Number)

e.g. $\frac{127 - 90}{18} = 2.055$

$= 2.0$

2 (a)

Observation	Inference
White residue ½ Colorless filtrate	Mixture of soluble and insoluble compounds 1mk

(i) Observation	Inference
White precipitate	CO_3^{2-} SO_4^{2-} SO_3^{2-}, Cl^- Present

(ii)

Observation	Inference
White precipitate	SO_4^{2-}
Ignore – No effervescence	present
Penalize – No white if mentioned	SO_4^{2-} should be mentioned in (i) above

(iii)

Observation	Inference
White precipitate ½	Zn^{2+} Present 1mk
Dissolve in excess ½	Penalize fully for any contradictory ion

(b)

Observation	Inference
Effervescence / bubbles	CO_3^{2-} , SO_3^{2-} 1mk
of colorless gas 1mk	2 – ions mentioned – 1mk Present
	1 – ion mentioned – 1/2mk

Observation	Inference
White Precipitate	Zn^{2+}, Pb^{2+}, Al^{3+}
Dissolve in excess	Present

(ii)

Observation	Inference
Yellow precipitate	Pb^{2+} present

Penalize – yellow only

Yellow solution

Penalize fully for any contradicting ion mentioned

3 (a) White ½ crystals/ solid ½

Observation	**Inference**
Dissolve ½ to form Colorless solution ½	Polar compound ½mk Penalize fully for polar salt

(ii) **Observation**	**Inference**
Purple color of acidified potassium 1mk Manganate changes to colorless Accept for 1mk $KMnO_4$ is delocalized	C=C , or C=C , ½ ROH ½ Present

(i)

Observation	**Inference**
Effervescence of colorless gas 1mk	H, $_3O^+$ R – COOH Present 1mk H^+, H_30^+, R - COOH

C) (i) Add/ put universal indicator to portion of e ½ mk
Match the color formed with the PH chart scale. ½

(ii)

Observation	**Inference**
PH 1.0 ½ mk Award ½ mk for PH=1 or PH=2 or PH=3 Penalize fully for given in range	Strongly Acidic ½ penalize fully for strong acid