CHEMISTRY PRACTICAL PP3

MARKING SCHEME

1. Table 1 6 marks

Volume of water in the boiling tube (cm^3)	Temperature at which crystals of solid A first appear	Solubility of solid A (g/100g water)
4	66.0	112.5
6	58.0	75.0
8	52.0	56.25
10	45.0	45.0

Column 1 4 marks

Distributed as follows:

(i) Complete table 2 marks

- Complete table with 4 readings 2 marks
- Incomplete table with 3 readings 1 ½ marks
- Incomplete table with 2 readings 1 mark
- Incomplete table with 1 reading 0 mark

(ii) Use of decimals 1 mark

- Accept unit if all readings are recorded consistently either as whole numbers or to 1 d. place of 0.0 or 0.5, otherwise penalize fully.

(iii) Trend ½ mark

- Award ½ mark for a continuous drop in temperature readings in column I, otherwise penalize fully.

Column II 2 marks

- Award ½ mark for each value of solubility correctly calculated, otherwise penalize fully.
- Ignore units in grams if attached to correct answer, otherwise penalize if wrong units are attached.

(iv) Graph 3 marks

Distributed as follows:-

(i) Labelling of axes ½ mark

- Penallise fully for any inversion of axis.
-Penallise fully if wrong units are given or shown BUT ignore if not attached.
- Penalise fully if only one axis is labeled.

(ii) Scale 1 mark

- Area covered in units should be at least ¾ of the total big square of the grid, given on both

vertical and horizontal axis, otherwise penalize fully.
- Scale intervals must be consistent, otherwise penallise fully.
- Scale chosen must accommodate all plots, otherwise penallise fully.

(iii) Plotting 1 mark
- Award 1mark for 3 or 4 points correctly plotted.
- If there are only 2 correctly plotted points, award ½ mark.
- Accept plots even when axis are interchanged.

(iv) Curve 1 mark
- Award 1 mark for a smooth rising curve joining at least 3 correctly plotted points of which one must be at 112.5 / 4.0cm^3 of water.
- Reject a curve obtained from wrong calculated values in column II.

d in (T) 1 mark
- Accept correct reading with or without showing on the graph.
- If shown on the graph but reading is wrongly read, or absent award ½ mark for showing.
- Penallise ½ mark for wrong units otherwise ignore if not shown.
- Reject any reading and showing from a wrong graph e.g exchange of axis, wrong plotting at volume of 4.0cm^3.

d in (J) 2 marks
Solubility at 50^0C = correct reading } √ ½
Solubility at 30^0C = correct reading }
Mass of crystals = correct ans √ ½

(e) (i) Table 2 5 marks

	I	II	III
Final burette reading	30.0	30.0	30.0
Initial burette reading	0.0	0.0	0.0
Volume of solution B used	30.0	30.0	30.0

Distributed as follows:-

(a) Complete table 1 mark

Conditions
(i) Complete table with 3 titrations 1 mark
(ii) Incomplete table with 2 titrations ½ mark
(iii) Incomplete table with 1 titration 0 mark

Penalties
- Wrong arithmetic
- Inverted tables.

- Values beyond 50.0cm^3 unless explained
- Unrealistic values i.e values below 1.0cm^3 and above hundreds

NB: Penalise ½ mark each to a maximum of ½ mark (penallise once)

2

(h) (i) Decimals 1 mark (Tied to 1st and 2nd rows only)

Conditions

- Accept 1 or 2 dp used consistently
- Accept 2 d.p only if the 2nd place of decimal is "0" or "5".
- Allow inconsistency of zeros i.e 0.0, 0.00 or 0 in the initial values

NB: Penallise fully if any of the conditions is not met.

c) Accuracy 1 mark

Compare any of the titre readings with school values (S.V) tick (√) the chosen value on the table.

Condition

- If any value is within ± 0.1 1 mark
- If any value is within ± 0.2 ½ mark
- If not within ± 0.2 0 mark

NB: If there is a wrong arithmetic or subtraction compare the S.V with the worked out correct value and ward accordingly.

d) Principles of averaging 1 mark

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

Conditions

- If 3 consistent values are averaged 1 mark
- If 3 titrations alone, only 2 possible and averaged 1 mark
- If 2 titrations alone, and are consistent and averaged 1 mark

NB: Award 0 mark if averaging involves.

- 3 consistent values but only 2 averaged
- 3 inconsistent values are averaged.
- 2 inconsistent values are averaged.

c) Final answer 1 mark (Tied to correctly averaged titre)

- If within ± 0.1 S.V 1 mark
- If within ± 0.2 S.V ½ mark
- If beyond ± 0.2 of S.V 0 marks

Calculations

II) Moles of $KMnO_4$ = $\frac{0.06 \times \text{titre}}{1000}$ √ ½

= correct answer √ ½

Conditions

(i) Penalise ½ mark for wrong transfer of titre, otherwise penallise fully for strange figure.

(ii) 0.06 must be transferred initial otherwise penalize fully.

III) Moles of A in $25.0cm^3$ = $\frac{\text{Ans in (II)} \times 5}{2}$

= correct ans

Conditions : As in II above

IV) RFM of A 2 marks

Moles in $250cm^3$ = $\frac{\text{an in III} \times 250}{25}$ √ ½

= correct ans

RFM = $\frac{4.5}{9}$ √1

= Correct answer √ ½

OR

Mass in $25cm^3$ = 0.45g √ ½

RFM = $\frac{0.45 \quad \sqrt{1}}{\text{Moles in part III}}$

= Correct answer √ ½

OR

Mass in $1000cm^3$ = 4.5 x 4 = 18g

Molarity of A = $\frac{1000 \times \text{ans III}}{25}$ √ ½

RFM = $\frac{18}{\text{Molarity}}$ √1

= correct ans √ ½

Penalties

(i) Penalise fully if 4.5 is not used intact

(ii) Reject if RFM is less than 108 and greater than 162.

(iii) Penallise ½ mark for any units used or attached to the final answer e.g g

(iii) Determining the value of X 2 marks

RFM of H_2O = 18 √ ½

18x = ans (IV) – 90

x = $\frac{\text{ans (IV)} - 90}{18}$ √

= correct answer √ ½

OR

RFM of H_2O = 18 √ ½

x = $\frac{\text{ans (IV)} - 90}{18}$ √1

= correct ans √ ½

OR

90 +18x √ ½ = ans (IV)

$x = \frac{\text{ans (IV)} - 90}{18}$ √1

= correct ans √ ½

OR

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

= correct ans

Penalties

- Penallise ½ mark if units given or attached to final answer.

NB: For all calculations, any working beyond the expected answer penalize fully.

Question 2

a)

Observation	inference	
Colorless gas given off which changes red litmus to blue	NH^{+}_{4} Present	

i)

Observation	Inference
Dissolves forming a colorless solution	Soluble Salt Coloured ions absent(Cu^{2+}, Fe^{2+} Fe^{3+} absent)

ii)

Observation	Inferences
White ppt formed	SO^{2-} 4 present

iii)

Observations	Inferences
White PPT soluble in excess Colorless gas which changes red litmus paper to blue	Al^{3+},Zn^{2+} ,present NH^{+} 4 present

iv)

Observations	Inferences
White precipitate formed efferrscence of colorless gas	Al^{3+} present

Question 3

Observation	Inferences
Sparingly soluble in cold water but soluble in warm water	Partially soluble salt

(i)

Observation	Inferences
Vigorous effervesces colorless gas burning with a pop sound	R-COOH present

ii)

Observation	inferences
Vigorous effervescence	R-COOH present

(iii)

Observations	Inferences
Bromine water not decolorized	C= ,C=C absent

iv)

Observation	Inférences
Potassium dichromate (vi) not decolorized	R-OH absent

(v)

Observation	Inférences
PH =5	R-COOH present