# KAPSABET HIGH SCHOOL

**MARKING SCHEME CHEMISTRY PAPER 3**

1. Table 1……..5mks

Award a maximum total of 5 marks distributed as follows.

i. Complete table……1mk

Conditions: either of the following:

- Complete Table with 3 Titrations done…… …… 1mk
- Incomplete Table with only 2 Titrations done…… ½mk
- Incomplete Table with only 1 Titration done…… …..0mrk
- For no Titration done……0mk

NOTE: where NO TITRATION done, penalize FULLY for ALL the marking points for Table 1.

Penalties:

before awarding a mark for complete Table; THE EXAMINER MUST ensure that none of the following mistakes is there in the Table- otherwise penalize ½mk for EACH MISTAKE but to a maximum penalty of ½mk(i.e. penalize ½mk ONCE even if there two or more mistakes):

- Wrong arithmetic/subtraction
- Inverted Table
- Burette reading(s) beyond 50.0$cm^3$, except where explained.

ii. Use of Decimals (tied to the 1st and 2nd ROWS ONLY)……..1mk

Conditions:

Either 1 or 2 decimal places used consistently.

If 2 decimal places are used then the 2nd decimal place MUST be either a "O"

iii. Accuracy (tied to CORRECT titre values ONLY)……1mk

Compare the candidate's CORRECT Titre values with the school values, (i.e. Teacher's Average Titre):

Conditions:

- If at least one titre value is within $\pm$0.10 $cm^3$ of SV, then awarded……1mk
- If No titre value is within $\pm$0.10 $cm^3$ of the SV but at least one titre value is within$\pm$0.20 $cm^3$ of the SV, then award ½mark
- If NONE of the titre values is within $\pm$0.20 $cm^3$ of the SV, then award……0mark

NOTE: If there is wrong arithmetic/ subtraction in the Table, compare the SV with the CORRECT worked out titre and award accordingly.

iv. Principles of averaging……1mk

Values averaged MUST be shown and MUST be consistent within $\pm 0.20\ cm^3$ of each other.

Conditions.

- If 3 consistent values are averaged……1mk
- If 3 titrations are done and only 2 possible averaged……1mk
- If only 2 titrations are done, and are inconsistent and averaged……1mk
- If only 2Titrations are done, and are inconsistent and yet averaged……0mk
- If 3 Titrations are done, ALL are possible and yet only 2 are averaged……0mk
- If 3 inconsistent values are averaged……0mk
- If only 1 Titration is done……0mk

Penalties:

- Wrong arithmetic, i.e. arithmetic error outside $\pm 2$ units in the 2nd decimal place (e.g. 24.67 given as 24.64), penalize ½mk
- If no WORKING is shown but "answer" given is correct, penalize ½mk.
- If value is rounded off to the1st decimal place (e.g. 24.66≈ 24.7) or to a whole – number (e.g.24.33≈24), penalize ½mk.
- If no working is shown but answer given is wrong, penalize FULLY, i.e. award 0mk

v. Final accuracy (tied to the CORRECT average titre)……1mk

- Compare the candidate's CORRECT average titre with the SV and award accordingly:
- If within $\pm 0.10\ cm^3$ of the SV, award……1mk
- If Not within $\pm 0.10\ cm^3$ of the SV, but it is within $\pm 0.20\ cm^3$ of the SV, award ……½mk
- If BEYOND $\pm 0.20\ cm^3$ of the SV, award……0mk

TABLE 1

Complete table……1mk
Use of decimals……1mk
Accuracy ……1mk
Principles of averaging……1mk

Final accuracy.....1mk

**Sub-total** 5mks

Calculations :

**(i)** Moles of NaOH in average titre = $\frac{0.05 \times 30.0}{1000}$ √½mk

$= 0.0015\ mol$ √½mk

Note:

- Units may not be given but if given Must be correct otherwise penalize½mark foe wrong units attached to correct answer.

**(ii).** Moles of HCl in 25 $cm^3$ of solution FA4

NaOH : HCl

1 : 1 √1mk

$0.0015\ mol$ $0.0015\ mol$ √1mk

(iii) $= \frac{0.0015 \times 250}{25}$ √1mk $= 0.015\ mol$ √1mk

Note:

- 0.0015 MUST be transferred and used INTACT otherwise penalize FULLY for any other figure used and award 0mk
- Accept answer given to at least 4 decimals places, otherwise penalize ½mk for rounding off to 3 decimal places or less.

(iv)

- Moles of HCl in 50 $cm^3$ of FA2 = $\frac{0.7 \times 50}{1000}$ √½mk

  = 0.035 √½mk

(v) moles of HCl that reacted with magnesium= Ans in (v) – ans in (iv)

0.035- 0.015√½mk = 0.02√½mk

(vi) Mg : HCl

1 : 2√½mk

$= \frac{0.02 \times 1}{2}$ √½mk $= 0.01\ mol$ √1mk

2. Table 2……4mks

Award a MAXIMUM TOTAL of 4mks distributed as follows:

i) Complete table……2mks

Conditions/ penalties

- Award $\frac{1}{2}mk$ for EACH experiment completely done.
- Penalize $\frac{1}{2}mk$ for EACH solubility value either wrongly worked out or not work to a MAXIMUM penalty of 1mark.
- Penalize 1mark ONCE for unrealistic Temperature readings, for any Temperature reading T$\leq 25.0℃ \; and \; T > 80.0℃$.
- Penalize$\frac{1}{2}mk$ if ALL Temperature readings given in the Table are CONSTANT.

ii) Use of decimals(Tied to Temperature reading)…… $\frac{1}{2}mk$

Accept ONLY if all readings recorded consistently either as whole numbers or to one decimal place of .0 or .5, otherwise penalize FULLY.

iii) Accuracy ……$\frac{1}{2}mk$

Compare the candidate's first Temperature reading (i.e. Temperature reading when the volume of water added is 5.00cm$^3$) with the school value, SV (i.e. the Teacher's temperature reading when the volume of water added is5.00cm$^3$). If within $\pm 2.0℃$ of the SV, awarded 1mark, otherwise awarded 0mark.

iv) Trend ……1mk

Award mark for Temperature readings showing a CONTINUOUS DROP, otherwise penalize FULLY.

Hence the distribution of marks for table 2 is as follows.

**TABLE 2**

| | |
|---|---|
| Complete table…… | 2mks |
| Use of decimals…… | $\frac{1}{2}mk$ |
| Accuracy …… | $\frac{1}{2}mk$ |
| Trend …… | 1mk |
| **Sub-total** | 4mks |

f) GRAPH……3mks

Award MAXIMUM total of 3marks distributed as follows

A. Labeling of the axes……$\frac{1}{2}mk$.

Award $½mk$ ONLY if BOTH axes are CURRECTLY labelled.

Penalties:

- Penalize FULLY for inversion of axes
- Penalize FULLY for wrong unit given, otherwise ignore if units are omitted.
- Penalize FULLY if only ONE axis is correctly labelled.

B. Scale ……$½mk$

Award $½mk$ for scale subject to the following conditions.

Conditions:

- Area covered by the PLOTS must be at least half the grid on EACH of the axis
- Scale intervals MUST be consistent on EACH axis.
- Scale chosen must be able to accommodate ALL plots/ points-Examiner MUST check the range of the readings on EACH axis.

Note: panelize FULLY if any of the above three conclusions is NOT met.

C. Plotting ……..1mk

Award maximum of 1 mark for plotting.

Conditions:

- if 6 or 5 points are correctly plotted award ……1mk
- if only 4 or 3 points are correctly plotted award $½mk$
- If less than 3 points are correctly plotted award…….0 mark.

D. Curve ……1mk

Award 1mark for a smooth rising curve joining at least three correctly plotted points.

Note: Reject curve obtained by plotting 2 or more wrongly calculated solubility values from table 2.

Hence the distribution of marks for the graph is as follows.

| | |
|---|---|
| GRAPH | Label of axes…… $½mk$<br>Scale……..…$½mk$<br>Plotting……..1mk<br>Curve ……1mk<br>Sub-total 3mks |

(g)

(I) Correct reading from the graph. √1mk

(II) Correct reading from the graph. √1mk

(h) 100g – ans in (g)(ii) √1mk

Final ans √1mk

3. a

(i)

| OBSERVATION(S) | INFERENCE(S) |
|---|---|
| • White ppt √½mk formed which then dissolves √½mk in excess alkali forming a colourless solution. | $Al^{2+}$, $Pb^{2+}$, $Zn^{2+}$,present√1mk<br>• All 3 ions given<br>• Only two ions given.½mk<br>• Only one ion given. 0mk |

(ii)

| OBSERVATION(S) | INFERENCE(S) |
|---|---|
| • White ppt√½mk formed which is insoluble √½mk in excess aqueous ammonia | $Al^{2+}$√½mk , $Pb^{2+}$,√½mk present<br>• Penalize ½ mark for each contradictory ion. |

(iii)

| OBSERVATION(S) | INFERENCE(S) |
|---|---|
| | |
| • White ppt formed √1mk<br>Type equation here. | $Pb^{2+}$ present. √1mk |

(iv)

| OBSERVATION(S) | INFERENCE(S) |
|---|---|
| • Yellow White precipitates formed $\sqrt{}1mk$ | $Pb^{2+}$ present. $\sqrt{}1mk$<br>• Penalize FULLY for any contradictory ion.<br>(1mks) |

(v)

B. (i)

| OBSERVATION(S) | INFERENCE(S) |
|---|---|
| • Solution has pH=2 $\sqrt{}1mk$ .<br>• NOTE. Reject pH given as range. | Solution is <u>strongly acidic</u>. $\sqrt{}1mk$<br>• NOTE. Reject the solution is "strong acid".<br>• Correct inference tied to correct pH. |

(ii)

| OBSERVATION(S) | INFERENCE(S) |
|---|---|
| • $KMnO_4$ solution is decolourised $\sqrt{}1mk$<br>OR<br>• $KMnO_4$ solution changes from purple to colourless. $\sqrt{}1mk$<br>• NOTE. Reject " solution becomes/ turns colourless" or " it turns colourless" | R-OH and $> C = C <$/$-C \equiv C -$ present $\sqrt{}1mk$ |

(iii)

| OBSERVATION(S) | INFERENCE(S) |
|---|---|
| • Effervescence producing a clourless gas $\sqrt{}1mk$ | R-COOH present $\sqrt{}1mk$ |