Markscheme

November 2025

Chemistry

Standard level

Paper 1 – Section B

11 pages

Subject Details: Chemistry Standard Level Paper 1B Markscheme

Candidates are required to answer **ALL** questions. Maximum total = **[25 marks]**.

1. Each row in the "Question" column relates to the smallest subpart of the question.

2. The maximum mark for each question subpart is indicated in the "Total" column.

3. Each marking point in the "Answers" column is shown by means of a tick (✓) at the end of the marking point.

4. A question subpart may have more marking points than the total allows. This will be indicated by "**max**" written after the mark in the "Total" column. The related rubric, if necessary, will be outlined in the "Notes" column.

5. An alternative word is indicated in the "Answers" column by a slash (*/*). Either word can be accepted.

6. An alternative answer is indicated in the "Answers" column by "***OR***". Either answer can be accepted.

7. An alternative markscheme is indicated in the "Answers" column under heading **ALTERNATIVE 1** *etc*. Either alternative can be accepted.

8. Words inside chevrons **« »** in the "Answers" column are not necessary to gain the mark.

9. Words that are underlined are essential for the mark.

10. The order of marking points does not have to be as in the "Answers" column, unless stated otherwise in the "Notes" column.

11. If the candidate's answer has the same "meaning" or can be clearly interpreted as being of equivalent significance, detail and validity as that in the "Answers" column then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by ***OWTTE*** (or words to that effect) in the "Notes" column.

12. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.

13. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script.

14. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the "Notes" column.

15. If a question specifically asks for the name of a substance, do not award a mark for a correct formula unless directed otherwise in the “Notes” column. Similarly, if the formula is specifically asked for, do not award a mark for a correct name unless directed otherwise in the “Notes” column.

16. If a question asks for an equation for a reaction, a balanced symbol equation is usually expected, do not award a mark for a word equation or an unbalanced equation unless directed otherwise in the “Notes” column.

Ignore missing or incorrect state symbols in an equation unless directed otherwise in the “Notes” column.

Question			Answers	Notes	Total
1.	(a)		«0.5000 dm^{-3} × 0.2500 mol dm^{-3} × 40.00 g mol^{-1}=» 5.000 «g» ✓		1
1.	(b)		*Any three of:* «fully» dissolve NaOH in distilled/deionized/pure water ✓ add/transfer «solution» with washings ✓ fill up to line/mark ✓ «stopper the flask and» turn over «several times»/shake/homogenize «the solution» ✓	*Do **not** penalize if incorrect mass is given.* *Penalize **[1]** mark if distilled/deionized/pure water not mentioned once in response.* *Do **not** accept stir for mix for M4.* *Do **not** award any marks for preparation of solution by dilution.*	3 max

1.	**(c)**			*Do **not** award M1 without all 3 values containing the correct number of significant figures.* *Do **not** penalize M2 for incorrect significant figures.* *Apply ECF from M1 for M2 for any value given.*	**2**

	NaOH Trial 1
Initial volume/cm^3	10.15
Final volume/cm^3	22.60
Volume used/cm^3	12.45

✓

«12.45 cm^{-3} × 0.2000 mol dm^{-3}/ 10.00 cm^{-3} = » 0.2490 «mol dm^{-3}» ✓

1.	**(d)**		$\ll \left\lvert \frac{0.2490 - 0.2500}{0.2500} \right\rvert x100 \gg 0.4000 \ll \% \gg$ ✓	*Award **[1]** if 0.2155 mol dm^{-3} is used and answer is "13.80"* «%».	**1**

1.	**(e)**		«solid /NaOH/sodium hydroxide is » hydroscopic/will absorb water/moisture «from air» ***OR*** «solid /NaOH/sodium hydroxide is » reacts with/absorbs CO_2 /carbon dioxide «from air» ✓ actual concentration cannot be determined by mass «of NaOH»✓	*Accept "«solid» reacts with water from air/atmosphere" for M1.* *Accept "to confirm/determine the actual/accurate concentration" for M2.* *Do **not** accept "to ensure same concentration of NaOH throughout experiment" for M2.*	**2**

Question			**Answers**	**Notes**	**Total**
2.	**(a)**		«26.77°C – 25.00 °C = » 1.77 «°C/K» ✓ «5.65 g × 4.18 J $g^{-1}K^{-1}$× 1.77 °C = » 41.8 «J» ✓	*Award **[2]** for correct final answer.*	**2**
2.	**(b)**		«26.77°C – 100.00°C = » –73.23 «°C/K » ✓ «–41.8 J/1.28 g × –73.23°C = » 0.446 «J g^{-1} K^{-1}» ✓	*Award **[2]** for correct final answer.* *Award **[2]** if 40.5 J is used and answer is "0.432" «J g^{-1} K^{-1}».* *Award **[1] max** for–0.446 «J g^{-1} K^{-1}».*	**2**
2.	**(c)**		iron ✓		**1**

2.	**(d)**		*Any two of:* loss of heat from metal during transfer ✓ loss of heat from/no insulation for beaker B/second calorimeter ≪ to surrounding ≫ ✓ water evaporating from beaker B/second calorimeter during metal transfer ✓ not accounting for the heat absorbed by/heat capacity of beaker B/second calorimeter ✓	*Accept "water mass very small".* *Accept "distilled/deionized/pure water not used".* *Do **not** penalize failing to identify beaker more than once.* *Do **not** accept "metal may have oxidized".* *Do **not** accept "water transferred with metal" as this would give opposite result.* *Do **not** accept "heat loss" alone.*	**2 max**

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Notes</th><th>Total</th></tr>
<tr><td>3.</td><td>(a)</td><td></td><td>saturate chamber/chromatogram with solvent vapor ✓

prevents evaporation of solvent/propan-2-ol/alcohol «before completion of experiment»
OR
maintains solvent composition/ratio ✓</td><td>Accept “affects/increases distance the solvent travels” for M1.

Award [1] for descriptions of safety precautions due to volatile solvents for M2.

Do not accept “moisture/water absorbed from air «on paper» changes concentration of propan-2-ol" for M2.</td><td>2</td></tr>
<tr><td>3.</td><td>(b)</td><td></td><td>Horizontal start line:
prevent angled solvent front for improved separation
OR
moves up vertically giving best separation
OR
solvent moves straight up paper «at same rate» ✓

Above the solvent level:
solute/sample/ink will dissolve in the solvent «with irregular/unpredictable movement» ✓</td><td>Accept “more consistent separation/solvent front distance/Rf values” for M1.

Accept ”accurately measure distance travelled by dots/solvent” for M1.

Award "ink spot wouldn’t move" OR "chromatogram would be blank" for M2.</td><td>2</td></tr>
<tr><td>3.</td><td>(c)</td><td></td><td><table><tr><th>Substances</th><th>R_F values</th></tr><tr><td>Red ink separated with 20% propan-2-ol</td><td>0.566 ✓</td></tr><tr><td>Red ink separated with 80% propan-2-ol</td><td>0.451 ✓</td></tr></table></td><td>Accept 0.530-0.580 for M1.

Accept 0.430-0.480 for M2.</td><td>2</td></tr>
</table>

3.	**(d)**		blue ***AND*** travels further with higher concentration water/lower concentration propan-2-ol ***OR*** blue ***AND*** travels less with lower concentration water/higher concentration propan-2-ol ✓ higher concentration water mixture more polar ***OR*** higher concentration propan-2-ol mixture less polar✓		**2**
3.	**(e)**		*Any one of:* try different solvent/solvent system ✓ run 2D chromatogram/turn chromatogram 90° ***AND*** run again ✓ run chromatogram on longer paper «for longer time»✓ run as silica gel/thin layer chromatography/TLC ✓		**1 max**