2225 – 6223M

Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

May 2025

Chemistry

Standard level

Paper 1B

7 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.

<table>
<tr><th colspan="3">Question</th><th>Answers</th><th>Notes</th><th>Total</th></tr>
<tr><td>1.</td><td>(a)</td><td>(i)</td><td>Any two of:
<table><tr><td>Precaution</td><td>Reason</td></tr><tr><td>1. safety glasses/goggles
OR
«face» mask/shield</td><td>«prevent damage from» corrosive acid/gas
OR
prevent contact with eyes ✓</td></tr><tr><td>2. fume cupboard/fume hood</td><td>«prevent poisoning by» toxic gases
OR
prevent inhalation of harmful fumes ✓</td></tr><tr><td>3. gloves/tongs</td><td>prevent burns «from heat/acid»
OR
prevent contact with skin ✓</td></tr></table></td><td>Accept protective eyewear for M1.

Do not accept gas mask for M2.
Do not accept well-ventilated room or outside for M2.

Do not award marks for general safety procedures such as wearing a lab coat, or tying hair back, but do not penalize if applying list principle.

Award [1 max] for any 2 correct precautions or 2 correct reasons, or 1 of each, even if placed on wrong lines.</td><td>2 Max</td></tr>
<tr><td>1.</td><td>(a)</td><td>(ii)</td><td>«1»Cu(s) + 4HNO_3(aq) → «1»$Cu(NO_3)_2$(aq) + 2NO_2(g) + 2H_2O(l)✓</td><td>Accept any correct multiples or fractions.</td><td>1</td></tr>
<tr><td>1.</td><td>(a)</td><td>(iii)</td><td>« (63.55 x 0.0100) ÷ 2» = 0.318«g»✓</td><td></td><td>1</td></tr>
<tr><td>1.</td><td>(b)</td><td></td><td>Measurement 1: temperature ✓

Expected result: increases «in the forward direction» ✓

Measurement 2: pressure «at constant volume» ✓

Expected result: decreases «in the forward direction» ✓</td><td>Accept answers in either order.

Accept other correct methods such as IR and UV spectroscopy.</td><td>4</td></tr>
<tr><td>1.</td><td>(c)</td><td>(i)</td><td>water bath/hot plate/oven/incubator
AND
thermostatic/temperature controlled/thermometer ✓</td><td>Do not accept temperature-controlled environment/room.

Accept set to «40°C» as implying temperature controlled.</td><td>1</td></tr>
</table>

Question			Answers	Notes	Total
1.	(c)	(ii)	equilibrium not reached ✓	*Accept insufficient time for temperature to reach 40°C.* *Accept absorbance/colour/[NO_2] still changing/not constant / reaction is still occurring.* *Do **not** award the mark if the answer implies it is a reaction going to completion such as stating "not fully occurred".*	**1**
1.	(c)	(iii)	repeat/wait until reading/absorbance/colour is constant/stops changing ✓	*Do **not** accept waiting, unless there is reference to an observation becoming constant.*	**1**
1.	(d)		«0.00134/(0.00732)^2 =» 25✓.	*Answer must be to 2 sf.*	**1**
1.	(e)	(i)	*Transferring 25.0 cm^3 of the solution for titration:* «volumetric/graduated» pipette/pipet ***AND*** *Adding the NaOH solution during the titration:* burette/buret ✓.	*Both required for the mark.*	**1**

Question			Answers	Notes	Total
1.	**(e)**	**(ii)**	allows for at least 3 «titration» results ✓ initial and final burette reading/volume «of NaOH» ***AND*** correct units ✓	*Table can have any orientation.* *Do **not** award M2 for just single volume of NaOH rather than two separate readings.* *Do **not** penalize uncertainties.* *Do **not** penalize additional header rows/columns.*	**2**
1.	**(e)**	**(iii)**	«(0.10/20.05)x100» = 0.50«%» ✓	*Accept 0.5«%»*	**1**
1.	**(e)**	**(iv)**	273.2 293.2 323.2 373.2 ✓	*Accept 273.15; 293.15; 323.15; 373.15.* *Accept 273.0; 293.0; 323.0; 373.0.* *Accept 273; 293; 323; 373.*	**1**

Question			Answers	Notes	Total
1.	**(e)**	**(v)**	yes ***AND*** *K* decreases as T increases✓		**1**
2.	**(a)**		*Any 3 of:* known mass of solid ✓ «fully» dissolve in distilled/deionized/pure water ✓ use volumetric flask ✓ make up to line ✓ mix/invert/shake «the final solution» ✓	*Marking points can be in any order.*	**3 max**
2.	**(b)**		«dilute solution to» make several/multiple concentrations ✓ measure the absorbance/transmittance «of these solutions»✓ plot graph of absorbance/transmittance vs/against concentration «with a straight line of best fit» ✓	*Do **not** accept "colour" for absorbance/transmittance for M2.*	**3**
2.	**(c)**		measure the absorbance/transmittance «of the unknown» ***AND*** use graph to determine concentration ✓	*Accept "Draw a line across from the absorbance/transmittance «on the y-axis» to the calibration curve and read off «intercept on» the concentration «axis».* *Accept use of the equation of the line. Do **not** accept "colour" instead of absorbance, unless applying ECF from 2(b).*	**1**