



Rewarding Learning

ADVANCED
General Certificate of Education
2017

Chemistry

Assessment Unit A2 3

assessing

Module 3: Practical Examination

Practical Booklet B

[AC234]

THURSDAY 22 JUNE, AFTERNOON

**MARK
SCHEME**

Annotation

1. Please do all marking in **red** ink.
2. All scripts should be checked for mathematical errors. Please adopt a system of one tick (✓) equals 1 mark, e.g. if you have awarded 4 marks for part of a question then 4 ticks (✓) should be on this candidate's answer.
3. The total mark for each question should be recorded in a circle placed opposite the question number in the teacher mark column.
4. As candidates have access to scripts please do not write any inappropriate comments on their scripts.

General points

- All calculations are marked according to the number of errors made.
- Errors can be carried through. If the wrong calculation is carried out then the incorrect answer can be carried through. One mistake at the start of a question does not always mean that all marks are lost.
- Any number of decimal places may be used provided the 'rounding' is correct.
- Listing is when more than one answer is given for a question that only requires one answer, e.g. the precipitate from a chloride with silver nitrate is a white solid; if the candidate states a white or a cream solid, one answer is correct and one answer is wrong. Hence they cancel out.
- Although names might be in the mark scheme it is generally accepted that formulae can replace them. Formulae and names are often interchangeable in chemistry.
- The marking of colours is defined in the 'CCEA GCE Chemistry Acceptable Colours' document.

MARKING GUIDELINES

Interpretation of the Mark Scheme

- **Carry error through**
This is where mistakes/wrong answers are penalised when made, but if carried into further steps of the question, then no further penalty is applied. This pertains to calculations and observational/deduction exercises. Please annotate candidates' answers by writing the letters c.e.t. on the appropriate place in the candidates' answers.
- **Oblique/forward slash**
This indicates an acceptable alternative answer(s).
- **Brackets**
Where an answer is given in the mark scheme and is followed by a word/words in brackets, this indicates that the information within the brackets is non-essential for awarding the mark(s).

1 (a) (i) $\text{Cu(s)} + 4\text{HNO}_3\text{(l)} \rightarrow \text{Cu(NO}_3)_2\text{(aq)} + 2\text{NO}_2\text{(g)} + 2\text{H}_2\text{O(l)}$	[2]	AVAILABLE MARKS 18
(ii) NO_2 is toxic/poisonous	[1]	
(iii) Gloves [1] nitric acid is corrosive [1]	[2]	
(b) (i) to remove H^+ [1]		
to prevent reverse of equilibrium/to drive equilibrium to RHS/to ensure all the Cu^{2+} reacts [1]	[2]	
(ii) Red to blue [1] solution of copper ions is blue [1]	[2]	
(c) table: 20.1, 19.5, 19.7 [1] average titre = 19.6 cm^3 [1] number of moles edta = $(19.6 \times 0.5)/1000 = 9.8 \times 10^{-3}$ number of moles Cu^{2+} in $25 \text{ cm}^3 = 9.8 \times 10^{-3}$ number of moles Cu^{2+} in $250 \text{ cm}^3 = 9.8 \times 10^{-2}$ number of moles $\text{Cu} = 9.8 \times 10^{-2}$ mass $\text{Cu} = 9.8 \times 10^{-2} \times 64 = 6.272 \text{ g}$ $\% \text{Cu} = \left(\frac{6.272}{7.0}\right) \times 100 = 89.6\%$ [4]	[6]	
(d) Add aqueous ammonia/ $\text{NH}_3\text{(aq)}$ [1] blue precipitate [1] add more aqueous ammonia $\text{NH}_3\text{(aq)}$ gives dark blue solution [1] or Add aqueous sodium hydroxide/ NaOH(aq) [1] blue precipitate [1] Insoluble in excess NaOH(aq) [1]	[3]	

2 (a)

AVAILABLE
MARKS

Test	Observations	Deductions
Make a solution of X in a beaker of deionised water.		
1 Add 5 drops of sodium hydroxide solution to a test tube one quarter filled with the solution of X .	white [1] precipitate [1] darkens [1]	<i>confirms Mn^{2+} ions</i>
2 Add 5 drops of dilute nitric acid and 5 drops of silver nitrate solution to a test tube one quarter filled with the solution of X . Add 5cm ³ of dilute ammonia solution to the test tube.	white precipitate [1] precipitate disappears/ dissolves [1]	<i>confirms Cl^- ions confirms Cl^- ions</i>
3 Place a spatula measure of solid X in a dry boiling tube and heat gently over a blue Bunsen burner flame.	colourless liquid on walls of tube [1]	<i>confirms solid is hydrated</i>

(b)

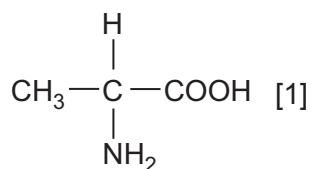
AVAILABLE
MARKS

Test	Observations	Deductions
1 Make a solution of a spatula measure of Y in a beaker of deionised water.	<i>colourless solution</i>	<i>soluble in water</i>
2 Add 2 cm ³ of copper(II) sulfate solution to 2 cm ³ of the solution of Y .	<i>dark blue solution</i>	able to act as a ligand/forms a complex [1]
3 Shine polarised light through the solution produced in Test 1 .	<i>plane of polarisation is rotated</i>	optically active/asymmetric C/chiral [1]
4 Add a small spatula measure of solid Y to a test tube one quarter filled with sodium carbonate solution.	<i>fizzing</i>	acidic [1]
5 Use melting point apparatus to determine the melting point of Y .	<i>melts at 258 °C</i>	strong bonds/ionic/zwitterion [1]

Amino acids [1]



or



12

3 (a) (i) in the reaction vessel	[1]	AVAILABLE MARKS
(ii) concentrated nitric acid } concentrated sulfuric acid } both for [1] $\text{H}_2\text{SO}_4 + \text{HNO}_3 \rightarrow \text{NO}_2^+ + \text{HSO}_4^- + \text{H}_2\text{O}$ [1]	[2]	
(iii) to neutralise the excess acid	[1]	
(b) (i) tin [1] concentrated hydrochloric acid [1]	[2]	
(ii) addition of (dilute) sodium hydroxide solution	[1]	
(iii) RMM of nitrobenzene = 123 RMM of phenylamine = 93 no. moles phenylamine = $11.16/93 = 0.12$ $60\% \rightarrow 100\%$ no. moles phenylamine = $\frac{0.12}{60} \times 100 = 0.2$ (1:1) no. moles nitrobenzene = 0.2 mass nitrobenzene = $0.2 \times 123 = 24.6 \text{ g}$ volume nitrobenzene = $\frac{24.6}{1.2} = 20.5 \text{ cm}^3$	[4]	
(c) sodium nitrite [1] (dilute/concentrated) hydrochloric acid [1]	[2]	
(d) (i) $\text{C}_6\text{H}_5\text{N}_2^+ + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_5\text{OH} + \text{N}_2 + \text{H}^+$	[2]	
(ii) measure volume of nitrogen using a gas syringe/measuring cylinder over water [1] plot volume of nitrogen against time [1] take tangents to determine gradient (gives rate at that point) [1]	[3]	
Quality of written communication	[2]	20
Total		50