

Pearson Edexcel International Advanced Level

Monday 19 January 2026

Afternoon (Time: 1 hour 20 minutes)

**Paper
reference**

WCH16/01A

Chemistry

International Advanced Level

UNIT 6: Practical Skills in Chemistry II

Question Paper

You must have:

Answer Book (sent separately)

Scientific calculator, ruler

Turn over ►

P87629A

©2026 Pearson Education Ltd.
C:1/1/1/1/1/1/




Pearson

Answer ALL questions.

Write your answers in the spaces provided in the Answer Book.

1 A compound of a d-block element is dissolved in deionised water to form solution **X**.

A series of tests is carried out on separate 1 cm³ portions of solution **X**.

(a) Complete the table in the Answer Book.

	Test	Observation	Inference	
(i)	Record the colour of solution X	Yellow-brown	The formula of the cation in solution X could be	(1)
(ii)	To 1 cm ³ of solution X in a test tube, add sodium hydroxide solution, drop by drop, until no further change occurs	A brown precipitate forms which remains when sodium hydroxide is in excess	The formula of the precipitate is	(1)
(iii)	To 1 cm ³ of solution X in a test tube, add potassium iodide solution	The colour of the mixture in the test tube becomes darker brown	The darker brown colour is due to the formation of	(1)
(iv)	To 1 cm ³ of solution X in a test tube, add a few drops of nitric acid followed by	A white precipitate forms	Solution X contains chloride ions	(1)
(v)	To 1 cm ³ of solution X in a test tube, add sodium carbonate solution		Solution X is acidic	(1)



- (b) Sulfur dioxide is passed through a sample of solution **X**.
A redox reaction occurs in which the sulfur dioxide forms sulfate ions.

The solution **Y** which forms is no longer yellow-brown.

A series of tests is carried out on solution **Y**.

Complete the table in the Answer Book.

	Test	Observation	Inference	
(i)	To 1 cm ³ of solution Y in a test tube, add an excess of dilute aqueous ammonia	A precipitate is seen The colour of the precipitate is	The formula of the precipitate is The formula of the cation in solution Y is	(3)
(ii)	Leave the mixture to stand for a few minutes	The surface of the precipitate turns brown	The formula of the brown compound is	(1)

- (c) Complete the ionic equation in the Answer Book for the reaction between the **cation** in solution **X** and sulfur dioxide to form solution **Y**.
State symbols are not required.

(1)

(Total for Question 1 = 10 marks)

- 2 The equation for the reaction between iodine and propanone in acidic solution is shown.



The order of reaction with respect to iodine was investigated using a titration method. The hydrogen ions and propanone were in large excess.

Outline procedure

Step 1 30 cm³ of 0.020 mol dm⁻³ aqueous iodine was added to a flask.

Step 2 30 cm³ of acidified aqueous propanone was added to the flask, the contents mixed thoroughly and a timer started.

Step 3 Every five minutes, a 10.0 cm³ sample was removed from the reaction mixture in the flask. Each sample was immediately run into a flask containing sodium hydrogencarbonate solution, which quenched the reaction.

Step 4 The volume of sodium thiosulfate solution needed to react with the iodine in each quenched sample was determined by titration.

- (a) Give an advantage of quenching the sample of the reaction mixture with a **solution** of sodium hydrogencarbonate rather than the solid.

(1)

- (b) The results obtained are shown in the table.

Volume of sodium thiosulfate added / cm ³	Time the sample was quenched / minutes
	0
18.50	5
16.10	10
13.50	15
10.90	20
8.50	25



(i) Plot a graph of volume of sodium thiosulfate against time on the grid in the Answer Book.

(3)

(ii) Calculate the gradient of the line drawn through the points.
Include units in your answer.

(2)

(c) Assume that the volume of sodium thiosulfate added is proportional to the amount of iodine in the reaction mixture.

Deduce the order of reaction with respect to iodine.
Justify your answer.

(1)

(d) Give a reason why it is acceptable for a sample of the reaction mixture to be quenched at times other than every 5 minutes, for example at 5 minutes 30 seconds.

(1)

(e) State why it is not possible to remove a sixth sample by pipette and how it would still be possible to titrate a sixth sample.

(2)

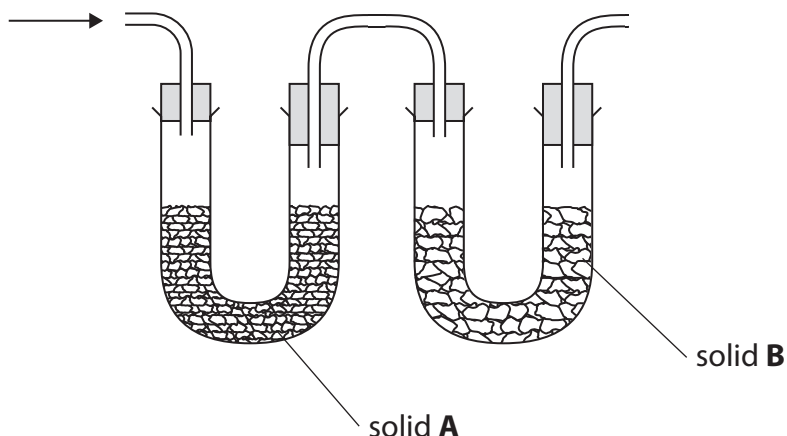
(f) Describe how the experiment could be modified to control the temperature.

(1)

(Total for Question 2 = 11 marks)

3 Compound **Q** is a white crystalline solid.

- (a) To determine its empirical formula, a sample of compound **Q** was burned completely and the combustion products passed through the apparatus shown.



Solid **A** absorbed water and solid **B** absorbed carbon dioxide.

- (i) Identify, by name or formula, suitable substances for solids **A** and **B**. (2)
- (ii) The percentage composition by mass of **Q** is carbon 54.5 %, hydrogen 3.90 % and oxygen 41.6 %.

Calculate the empirical formula of compound **Q**.

You **must** show your working.

(3)

- (b) Samples of compound **Q** are subjected to a series of tests.

- When a small sample of **Q** is ignited, it burns with a very smoky flame
- When a spatula measure of **Q** is added to a solution of sodium carbonate, vigorous effervescence occurs
- When a spatula measure of **Q** is added to a cold dilute solution of potassium manganate(VII), there is **no change** to the solution colour
- When a spatula measure of **Q** is added to a dilute solution of bromine water, the solution turns colourless and a white precipitate forms

State what can be deduced about **Q** from all of these tests.

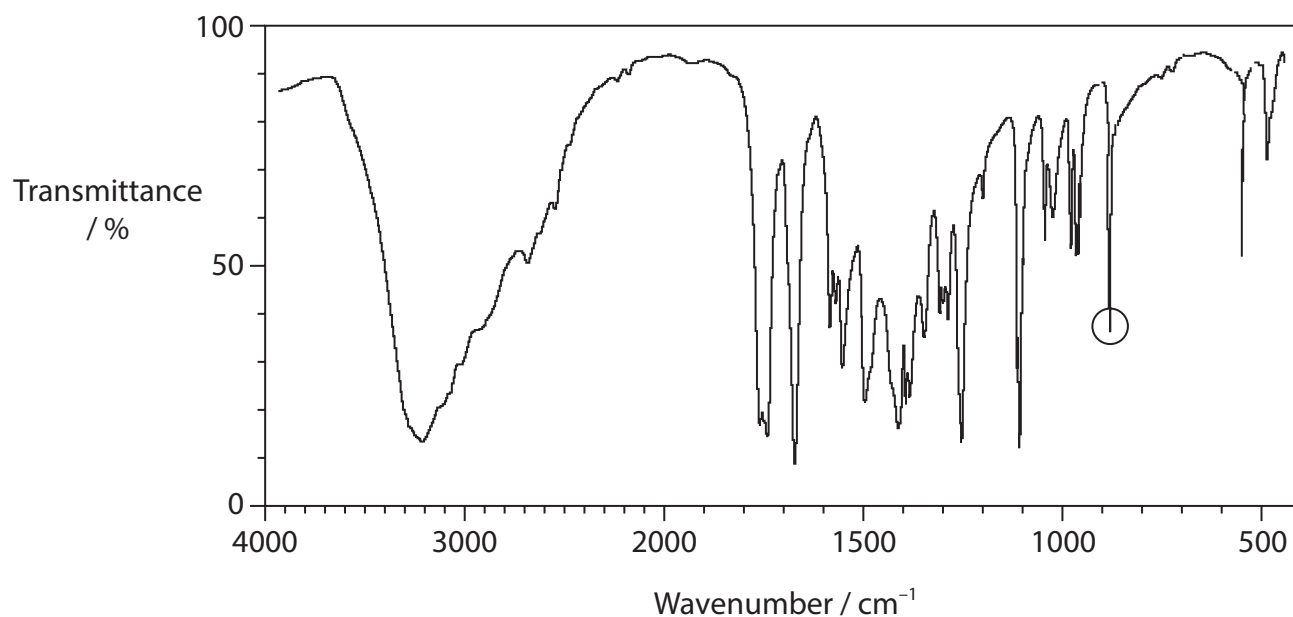
Justify your answers.

(4)

- (c) Draw **four** possible structures in the Answer Book of compound **Q** using the information from (a) and (b).

(3)

(d) The infrared spectrum of **Q** is shown. One of the peaks has been circled.



Infrared data for some organic functional groups is given in the table.

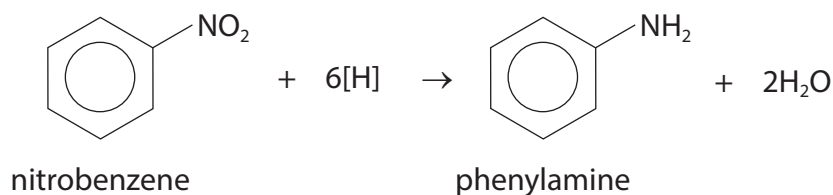
Group	Wavenumber range / cm^{-1}
C—H stretching vibrations	
Alkane	2962–2853
Alkene	3095–3010
Alkyne	3300
Arene	3030
C—H bending vibrations	
Alkane	1485–1365
Arene (5 adjacent hydrogen atoms)	750 and 700
Arene (4 adjacent hydrogen atoms)	750
Arene (3 adjacent hydrogen atoms)	780
Arene (2 adjacent hydrogen atoms)	830
Arene (1 isolated hydrogen atom)	880

Explain how the circled peak in the infrared spectrum and the table of infrared data may be used to deduce the structure of compound **Q**.

(2)

(Total for Question 3 = 14 marks)

- 4** The question is about the preparation of phenylamine by the reduction of nitrobenzene.



Outline procedure

Step 1 Add 3.10 cm³ of nitrobenzene, 5 g of granulated tin and 10 cm³ of concentrated hydrochloric acid to a round-bottomed flask.

Step 2 Add a few anti-bumping granules to the flask and heat the contents under reflux for 15 minutes. Leave to cool.

Step 3 Dissolve 7.5 g of sodium hydroxide in 10 cm³ of deionised water and add to the flask. An initial precipitate forms before redissolving.

Step 4 Add 15 cm³ of deionised water to the flask and steam distil the contents, collecting the cloudy distillate in a conical flask.

Step 5 Add 3 g of sodium chloride to the distillate and swirl to dissolve, before transferring the contents to a separating funnel. Add 8 cm³ of ether (ethoxyethane) to the funnel and shake, occasionally relieving the pressure. Allow the layers to separate.

Step 6 Discard the aqueous layer before transferring the ether layer to a clean flask containing some powdered magnesium sulfate.

Step 7 Decant the contents of the flask from Step **6** into a pear-shaped flask and distil off all the ether.

Step 8 Distil the remaining contents of the pear-shaped flask, collecting the fraction boiling between 180°C and 185°C.

Some data relating to the organic chemicals involved in this preparation are shown.

Chemical	Hazard	M_r	Density / g cm ⁻³	Boiling temperature / °C
Nitrobenzene	Toxic by inhalation and skin absorption	123.0	1.20	211
Phenylamine	Toxic by inhalation and skin absorption	93.0	1.03	184
Ether (ethoxyethane)	Highly flammable	74.0	0.71	35



- (a) Give **two** reasons why gloves should be worn in Step 1. (2)
- (b) Identify the reducing agent in the preparation. (1)
- (c) State the purpose of the addition of sodium hydroxide in Step 3. (1)
- (d) Suggest how the addition of sodium chloride in Step 5 increases the yield of phenylamine. (1)
- (e) (i) Draw a **labelled** diagram of the separating funnel at the **end** of Step 5. (2)
- (ii) Describe how you would relieve the pressure in the separating funnel in Step 5. (1)
- (f) State the purpose of the powdered magnesium sulfate in Step 6. (1)
- (g) State the apparatus that would be used to heat the pear-shaped flask to distil off the ether in Step 7.
Justify your answer. (2)
- (h) Calculate the **volume**, in cm^3 , of phenylamine formed in this preparation.
The limiting reagent is nitrobenzene and the overall yield by mass is 41.5%.
Refer to all the information at the start of the question. (4)

(Total for Question 4 = 15 marks)

TOTAL FOR PAPER = 50 MARKS



BLANK PAGE



BLANK PAGE



BLANK PAGE



Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International Advanced Level

Monday 19 January 2026

Afternoon (Time: 1 hour 20 minutes) **Paper reference** **WCH16/01A**

Chemistry
International Advanced Level
UNIT 6: Practical Skills in Chemistry II
Answer Book

You must have:
 Question Paper (sent separately)
 Scientific calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
 – *there may be more space than you need.*

Information

- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets
 – *use this as a guide as to how much time to spend on each question.*
- You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, including your use of grammar, punctuation and spelling.
- A Periodic Table is printed on the back cover of this paper.

Advice

- Read each question carefully before you start to answer it.
- Show all your working in calculations and include units where appropriate.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

P87622A

©2026 Pearson Education Ltd.
 C:1/1/1/




Pearson

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(a)

	Test	Observation	Inference	
(i)				
(ii)				(1)
(iii)				(1)
(iv)				(1)
(v)				(1)



(b)

	Test	Observation	Inference	
(i)				(3)
(ii)				(1)

(c)

(1)

**(Total for Question 1 = 10 marks)**

2

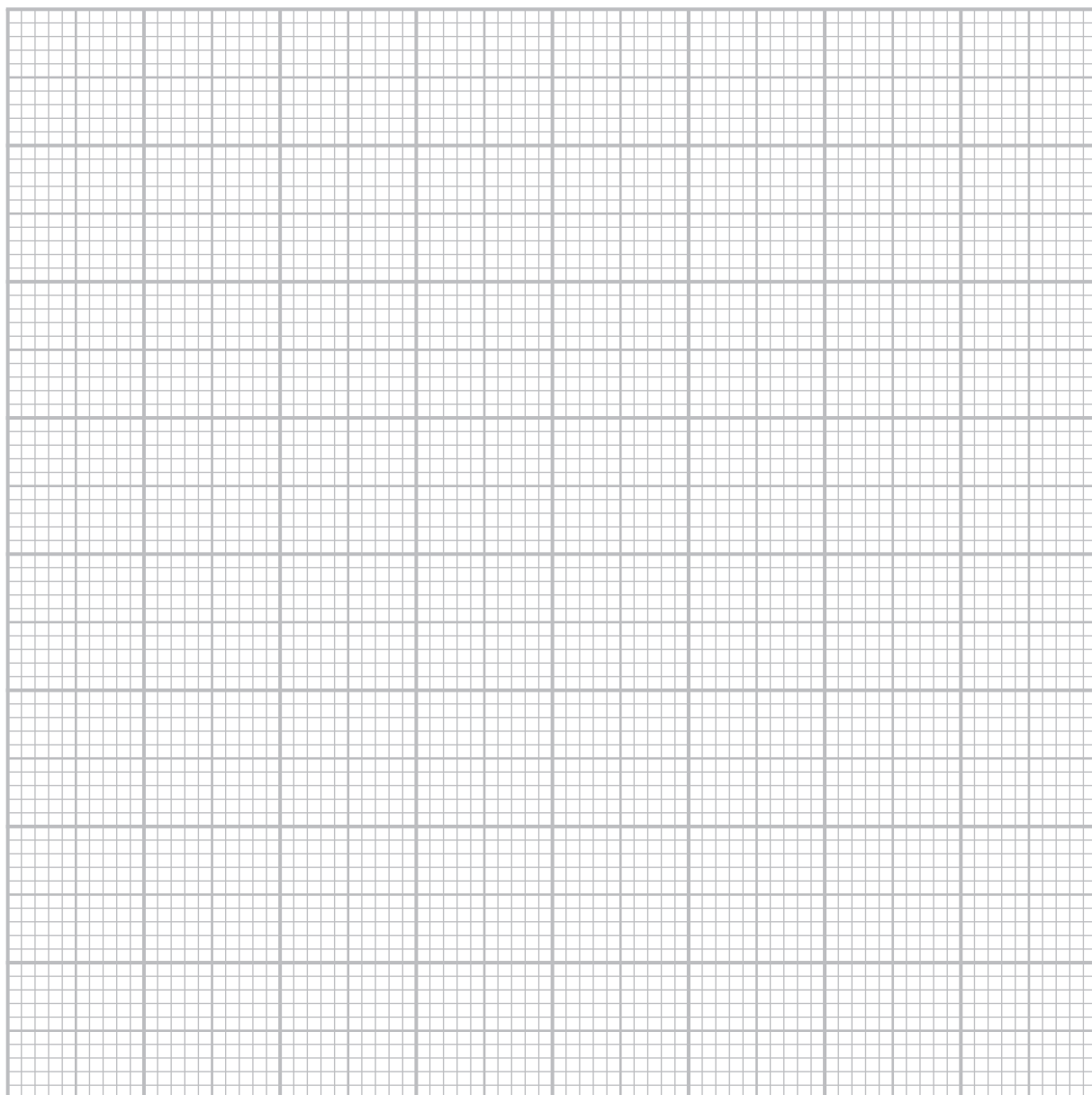
(a)

(1)

(b)

(i)

(3)



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



(ii)

(2)

(c)

(1)

(d)

(1)

(e)

(2)

(f)

(1)

(Total for Question 2 = 11 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

3

(a)

(i)

(2)

Solid **A**

Solid **B**

(ii)

(3)



(b)

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c)

(3)

--	--	--	--

(d)

(2)

.....

.....

.....

.....

(Total for Question 3 = 14 marks)



4

(a)

(2)

(b)

(1)

(c)

(1)

(d)

(1)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(e)

(i)

(2)

(ii)

(1)

(f)

(1)



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(g)

(2)

(h)

(4)

(Total for Question 4 = 15 marks)

TOTAL FOR PAPER = 50 MARKS



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE



The Periodic Table of Elements

1	2	3	4	5	6	7	0 (8)										
		1.0 H hydrogen 1															
Key																	
		relative atomic mass atomic symbol name atomic (proton) number															
(1)	(2)																
6.9 Li lithium 3	9.0 Be beryllium 4																
23.0 Na sodium 11	24.3 Mg magnesium 12																
39.1 K potassium 19	40.1 Ca calcium 20	45.0 Sc scandium 21	47.9 Ti titanium 22	50.9 V vanadium 23	52.0 Cr chromium 24	54.9 Mn manganese 25	55.8 Fe iron 26	58.9 Co cobalt 27	58.7 Ni nickel 28	63.5 Cu copper 29	65.4 Zn zinc 30	69.7 Ga gallium 31	72.6 Ge germanium 32	74.9 As arsenic 33	79.0 Se selenium 34	79.9 Br bromine 35	83.8 Kr krypton 36
85.5 Rb rubidium 37	87.6 Sr strontium 38	88.9 Y yttrium 39	91.2 Zr zirconium 40	92.9 Nb niobium 41	95.9 Mo molybdenum 42	[98] Tc technetium 43	101.1 Ru ruthenium 44	102.9 Rh rhodium 45	106.4 Pd palladium 46	107.9 Ag silver 47	112.4 Cd cadmium 48	114.8 In indium 49	118.7 Sn tin 50	121.8 Sb antimony 51	127.6 Te tellurium 52	126.9 I iodine 53	131.3 Xe xenon 54
132.9 Cs caesium 55	137.3 Ba barium 56	138.9 La* lanthanum 57	178.5 Hf hafnium 72	180.9 Ta tantalum 73	183.8 W tungsten 74	186.2 Re rhenium 75	190.2 Os osmium 76	192.2 Ir iridium 77	195.1 Pt platinum 78	197.0 Au gold 79	200.6 Hg mercury 80	204.4 Tl thallium 81	207.2 Pb lead 82	209.0 Bi bismuth 83	209 Po polonium 84	210 At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						
* Lanthanide series		140 Ce cerium 58	141 Pr praseodymium 59	144 Nd neodymium 60	150 Sm samarium 62	152 Eu europium 63	157 Gd gadolinium 64	159 Tb terbium 65	163 Dy dysprosium 66	165 Ho holmium 67	167 Er erbium 68	169 Tm thulium 69	173 Yb ytterbium 70	175 Lu lutetium 71			
* Actinide series		232 Th thorium 90	[231] Pa protactinium 91	238 U uranium 92	[237] Np neptunium 93	[243] Am americium 95	[247] Cm curium 96	[245] Bk berkelium 97	[251] Cf californium 98	[254] Es einsteinium 99	[253] Fm fermium 100	[256] Md mendelevium 101	[254] No nobelium 102	[257] Lr lawrencium 103			

* Lanthanide series

* Actinide series

Elements with atomic numbers 112-116 have been reported but not fully authenticated

