Electricity and chemistry

Question Paper 1

Level	IGCSE
Subject	Chemistry (0620/0971)
Exam Board	Cambridge International Examinations (CIE)
Topic	Electricity and chemistry
Sub-Topic	Electricity and chemistry
Booklet	Question Paper 1

Time Allowed: **45 minutes**

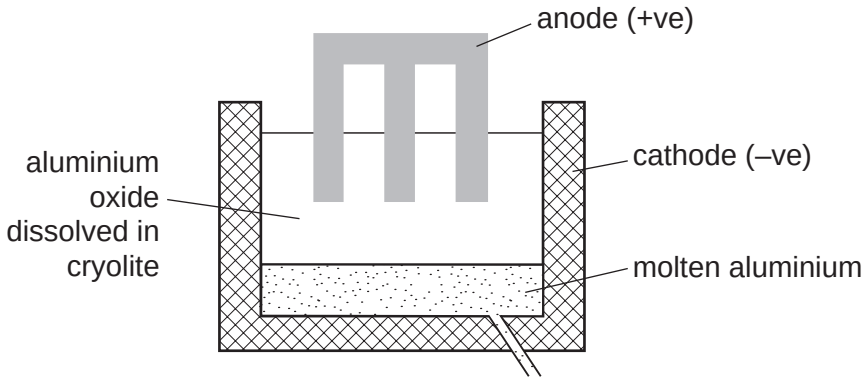
Score: **/37**

Percentage: **/100**

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	53%	48%	40%	33%	<25%

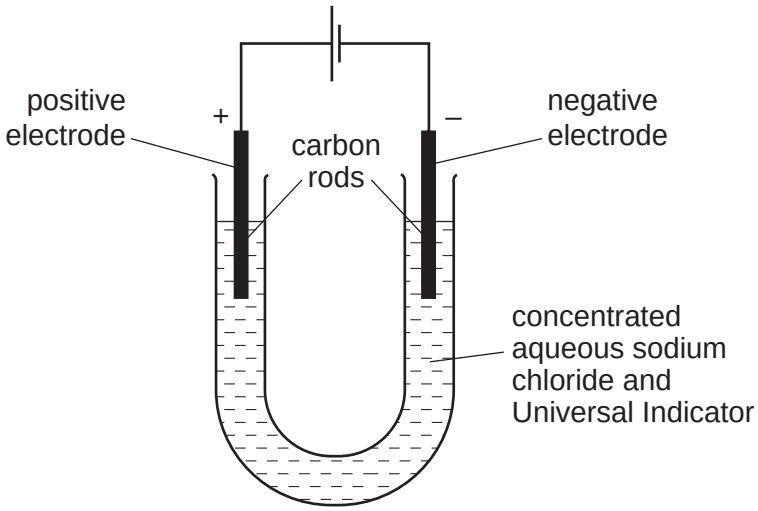
1 The diagram shows how aluminium is manufactured by electrolysis.



What are the anode and cathode made of?

	anode	cathode
A	aluminium	aluminium
B	aluminium	graphite
C	graphite	aluminium
D	graphite	graphite

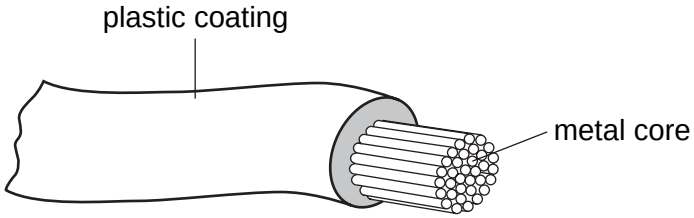
2 The diagram shows the electrolysis of concentrated aqueous sodium chloride.



What is the colour of the Universal Indicator at each electrode after five minutes?

	colour at anode (+ electrode)	colour at cathode (– electrode)
A	blue/purple	red
B	red	blue/purple
C	red	colourless
D	colourless	blue/purple

3 The diagram shows an electrical cable.



Which statement about the substances used is correct?

A The coating is plastic because it conducts electricity well.

B The core is copper because it conducts electricity well.

C The core is copper because it is cheap and strong.

D The core is iron because it is cheap and strong.

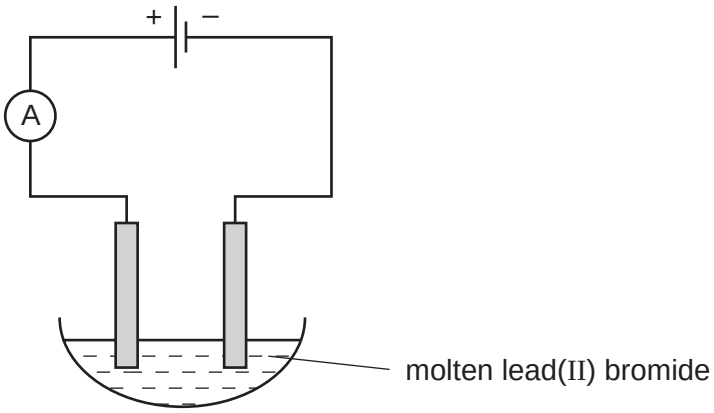
4 Aluminium is extracted from its oxide by electrolysis.

The oxide is dissolved in ……1…… cryolite and aluminium is deposited at the ……2……

Which words correctly complete gaps 1 and 2?

	1	2
A	aqueous	cathode
B	aqueous	anode
C	molten	cathode
D	molten	anode

5 Molten lead(II) bromide is electrolysed as shown.



Which ions are discharged at each electrode?

	positive electrode	negative electrode
A	Pb^{+}	Br^{2-}
B	Pb^{2+}	Br^{-}
C	Br^{2-}	Pb^{+}
D	Br^{-}	Pb^{2+}

6 Which of these elements could be formed at the anode when a molten salt is electrolysed?

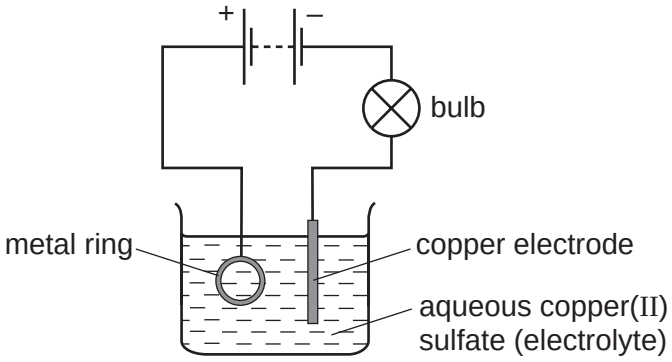
A copper

B iodine

C lithium

D strontium

7 The diagram shows apparatus used in an attempt to electroplate a metal ring with copper.



The experiment did not work.

What change is needed in the experiment to make it work?

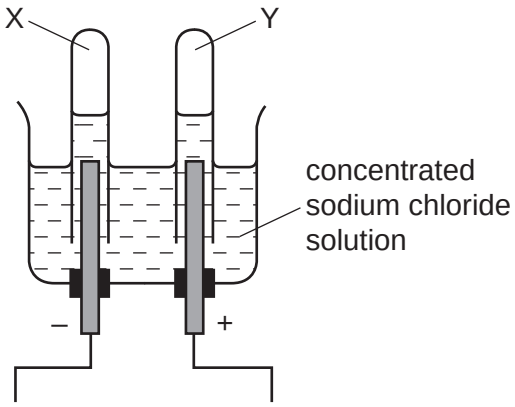
A Add solid copper(II) sulfate to the electrolyte.

B Increase the temperature of the electrolyte.

C Replace the copper electrode by a carbon electrode.

D Reverse the connections to the battery.

8 When concentrated sodium chloride solution is electrolysed, elements X and Y are formed.

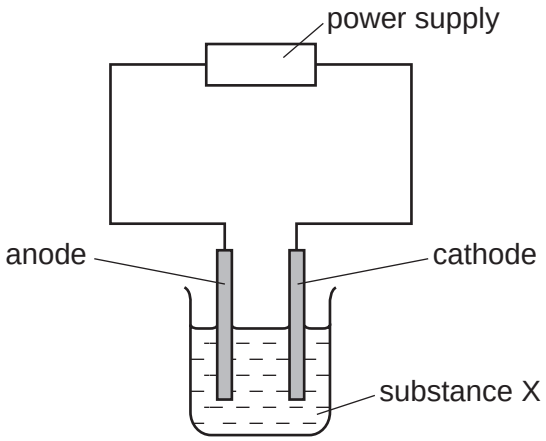


What are X and Y?

	X	Y
A	chlorine	hydrogen
B	hydrogen	chlorine
C	hydrogen	oxygen
D	oxygen	hydrogen

9 Substance X was electrolysed in an electrolytic cell.

A coloured gas was formed at the anode and a metal was formed at the cathode.



What is substance X?

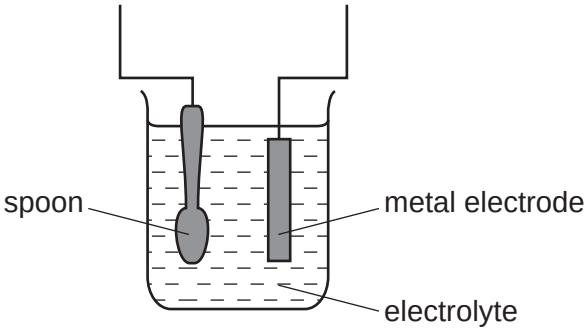
A aqueous sodium chloride

B molten lead bromide

C molten zinc oxide

D solid sodium chloride

10 The diagram shows apparatus for plating a spoon with silver.



Which statement is **not** correct?

A Silver would stick to the spoon because it is a very reactive metal.

B The electrolyte would be a silver salt dissolved in water.

C The metal electrode would be made from silver.

D The spoon would be connected to the negative of the power supply.

11 Aqueous copper(II) sulfate solution is electrolysed using inert electrodes.

Copper(II) ions (Cu^{2+}), hydrogen ions (H^+), hydroxide ions (OH^-) and sulfate ions (SO_4^{2-}) are present in the solution.

To which electrodes are the ions attracted during this electrolysis?

	attracted to anode	attracted to cathode
A	Cu^{2+} and H^+	OH^- and SO_4^{2-}
B	Cu^{2+} and SO_4^{2-}	H^+ and OH^-
C	H^+ and OH^-	Cu^{2+} and SO_4^{2-}
D	OH^- and SO_4^{2-}	Cu^{2+} and H^+

12 Three electrolysis cells are set up. Each cell has inert electrodes.

The electrolytes are listed below.

cell 1 aqueous sodium chloride

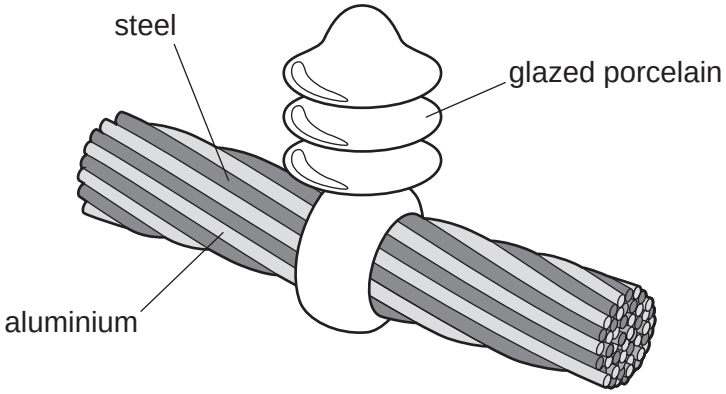
cell 2 concentrated hydrochloric acid

cell 3 molten lead(II) bromide

In which cells is a gas formed at **both** electrodes?

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

13 The diagram shows a section of an overhead power cable.



Which statement explains why a particular substance is used?

A Aluminium has a low density and is a good conductor of electricity.

B Porcelain is a good conductor of electricity.

C Steel can rust in damp air.

D Steel is more dense than aluminium.

14 Metals could be extracted from their molten chlorides using electrolysis.

Which substances are formed at each electrode?

	anode	cathode
A	chlorine	hydrogen
B	chlorine	metal
C	hydrogen	metal
D	metal	chlorine

15 Concentrated aqueous potassium bromide solution is electrolysed using inert electrodes.

The ions present in the solution are K^+, Br^-, H^+ and OH^-.

To which electrodes are the ions attracted during this electrolysis?

	attracted to anode	attracted to cathode
A	Br^- and K^+	H^+ and OH^-
B	Br^- and OH^-	H^+ and K^+
C	H^+ and K^+	Br^- and OH^-
D	H^+ and OH^-	Br^- and K^+

16 Electricity from a power station passes through overhead cables to a substation and then to a school where it is used to electrolyse concentrated hydrochloric acid using inert electrodes.

Which substances are used for the overhead cables and for the electrodes?

	overhead cables	electrodes
A	aluminium	copper
B	aluminium	platinum
C	copper	platinum
D	platinum	aluminium

17 Which statement about the electrolysis of molten lead(II) bromide is correct?

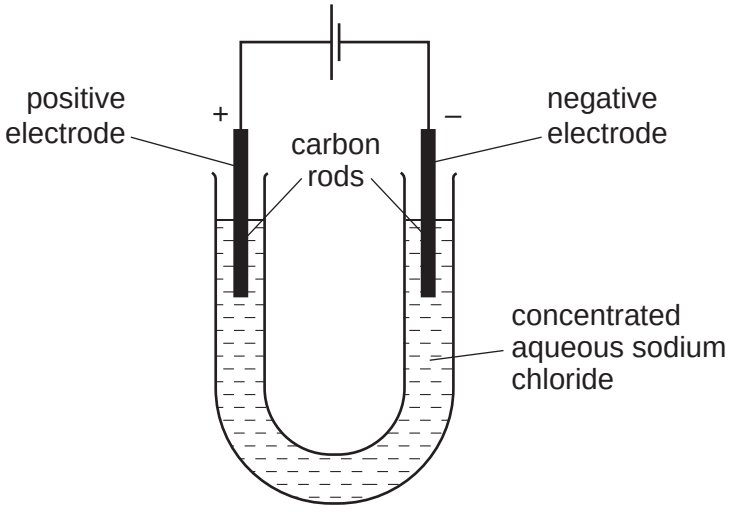
A A colourless gas is seen at the cathode.

B A grey metal is seen at the anode.

C A red / brown gas is seen at the anode.

D A red / brown metal is seen at the cathode.

18 Electricity is passed through concentrated aqueous sodium chloride, as shown.



What is the test for the gas formed at the positive electrode?

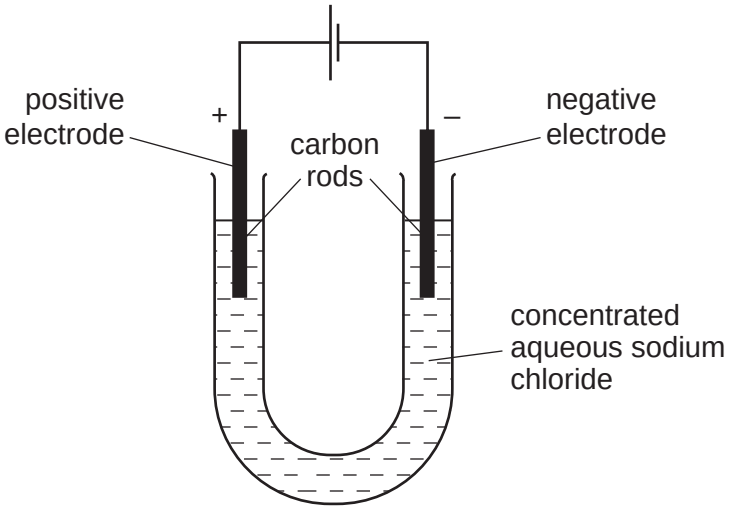
A bleaches damp litmus paper

B 'pops' with a lighted splint

C relights a glowing splint

D turns damp red litmus paper blue

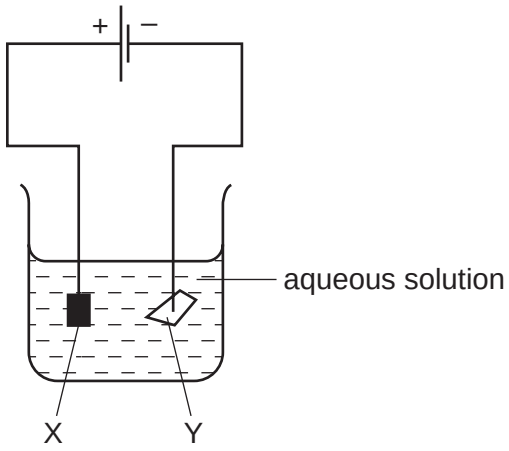
19 The diagram shows the electrolysis of concentrated aqueous sodium chloride.



What is produced at each of the electrodes?

	product at cathode	product at anode
A	hydrogen	chlorine
B	hydrogen	oxygen
C	sodium	chlorine
D	sodium	oxygen

20 The diagram shows an electrolysis experiment using metals X and Y as electrodes.



One of the metals becomes coated with copper.

Which metal becomes coated and which aqueous solution is used?

	metal	aqueous solution
A	X	$CrCl_3$
B	X	$CuCl_2$
C	Y	$CrCl_3$
D	Y	$CuCl_2$

21 In separate experiments, electricity was passed through concentrated aqueous sodium chloride and molten lead bromide.

What would happen in **both** experiments?

A A halogen would be formed at the anode.

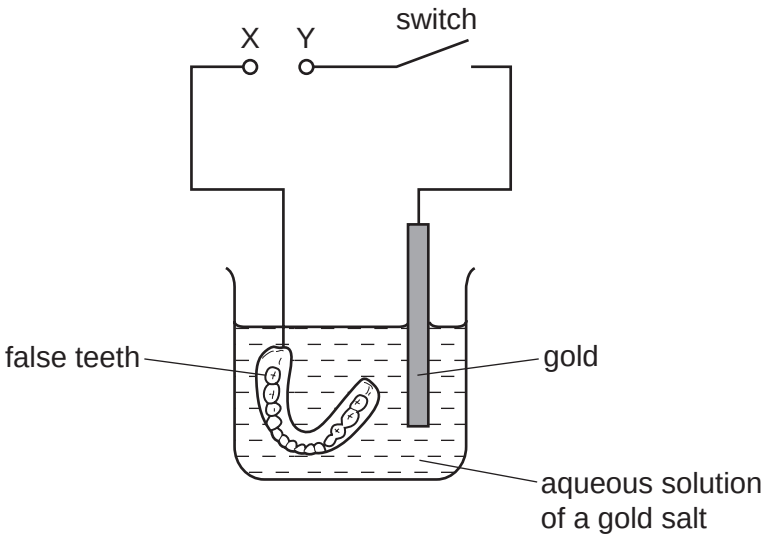
B A metal would be formed at the cathode.

C Hydrogen would be formed at the anode.

D Hydrogen would be formed at the cathode.

22 Winston Churchill, a British Prime Minister, had his false teeth electroplated with gold.

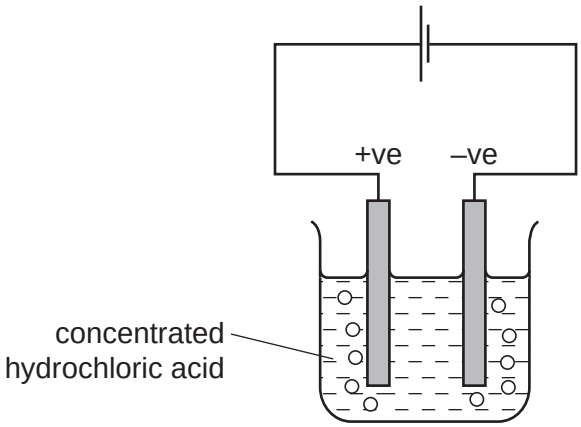
The teeth were coated with a thin layer of carbon and were then placed in the apparatus shown.



Which row is correct?

	terminal X is	the carbon powder could be
A	negative	diamond
B	negative	graphite
C	positive	diamond
D	positive	graphite

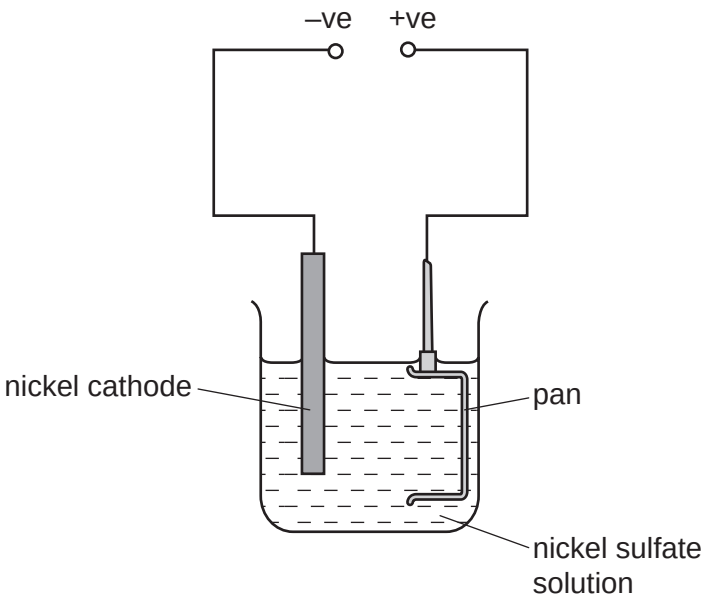
23 The diagram shows that two gases are formed when concentrated hydrochloric acid is electrolysed using inert electrodes.



Which row correctly describes the colours of the gases at the electrodes?

	anode (+ve)	cathode (–ve)
A	colourless	colourless
B	colourless	yellow-green
C	yellow-green	colourless
D	yellow-green	yellow-green

24 The diagram shows an unsuccessful experiment to nickel plate a pan.



Which change is necessary to plate the pan with nickel?

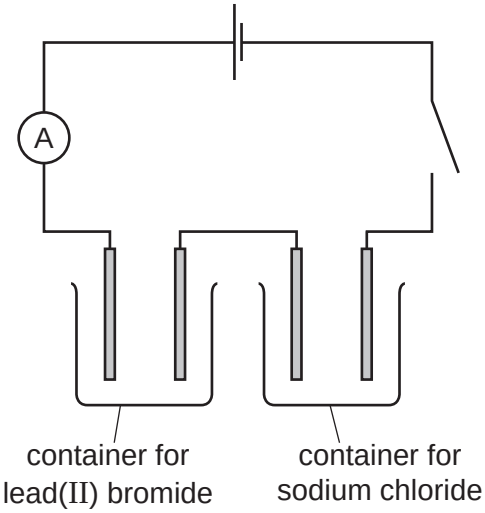
A Add more nickel sulfate to the solution.

B Heat the solution to 100 °C.

C Increase the current in the circuit.

D Make the pan the negative electrode.

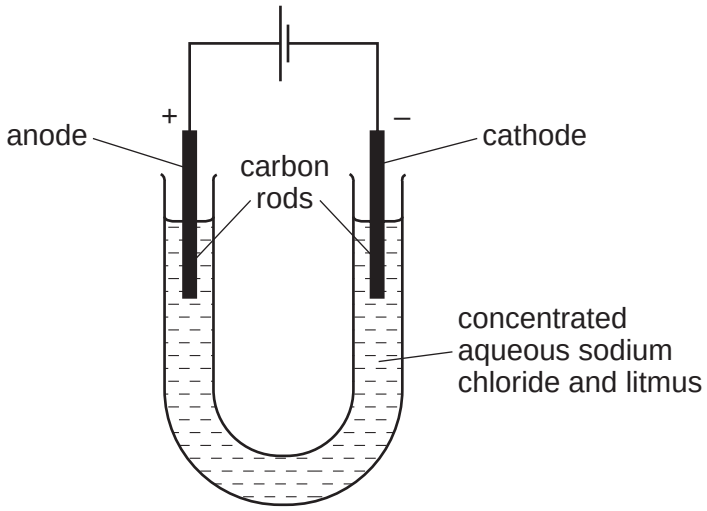
25 The diagram shows the circuit for electrolysing lead(II) bromide and sodium chloride to liberate the metal.



In what form are these salts electrolysed for liberating the metal?

	lead(II) bromide	sodium chloride
A	concentrated solution	concentrated solution
B	concentrated solution	molten
C	molten	concentrated solution
D	molten	molten

26 The diagram shows the electrolysis of concentrated aqueous sodium chloride.

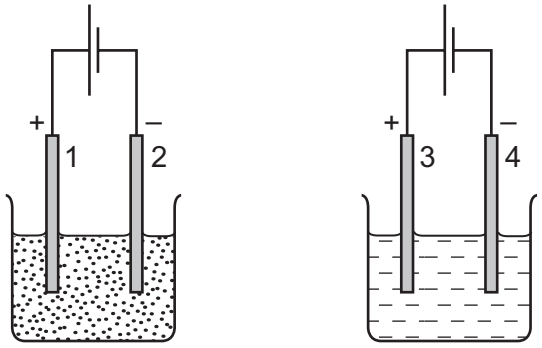


What is the colour of the litmus at each electrode after five minutes?

	colour at anode	colour at cathode
A	blue	red
B	red	blue
C	red	colourless
D	colourless	blue

27 Two electrolysis experiments were carried out as shown in the diagram below.

The graphite electrodes are labelled 1-4.



molten sodium chloride

concentrated aqueous sodium chloride

Which row describes the products at the electrodes in these experiments?

	electrode 1	electrode 2	electrode 3	electrode 4
A	chlorine	hydrogen	chlorine	hydrogen
B	chlorine	sodium	chlorine	hydrogen
C	chlorine	sodium	hydrogen	chlorine
D	sodium	chlorine	sodium	chlorine

28 One molten compound and two aqueous solutions were electrolysed.

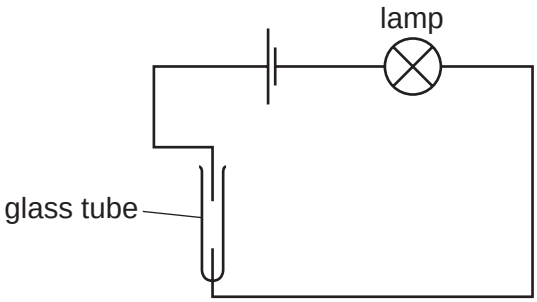
The table gives the compounds electrolysed and the electrodes used.

	substance electrolysed	electrodes
1	concentrated hydrochloric acid	carbon
2	concentrated sodium chloride	platinum
3	molten lead bromide	platinum

In which experiments is a gas evolved at the cathode?

A 1, 2 and 3 **B** 1 and 2 only **C** 1 only **D** 3 only

29 The diagram shows an incomplete circuit.



Which substance causes the lamp to light when added to the glass tube?

A aqueous sodium chloride

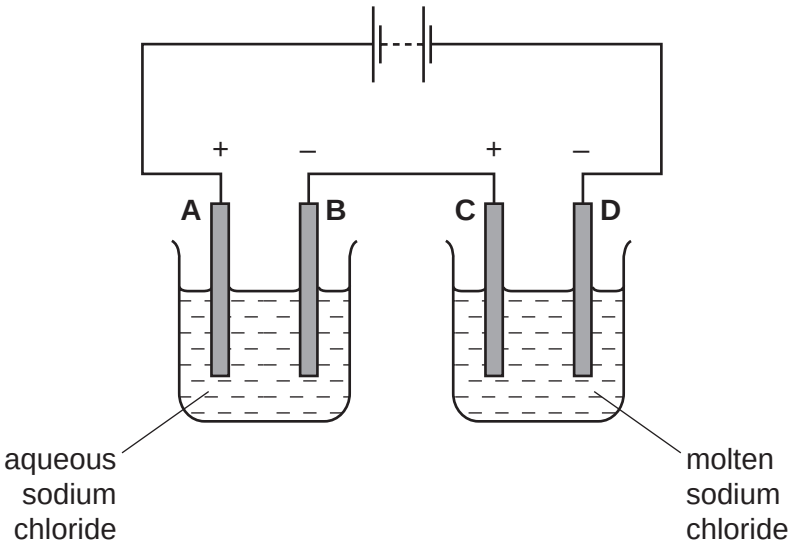
B aqueous sugar

C solid sodium chloride

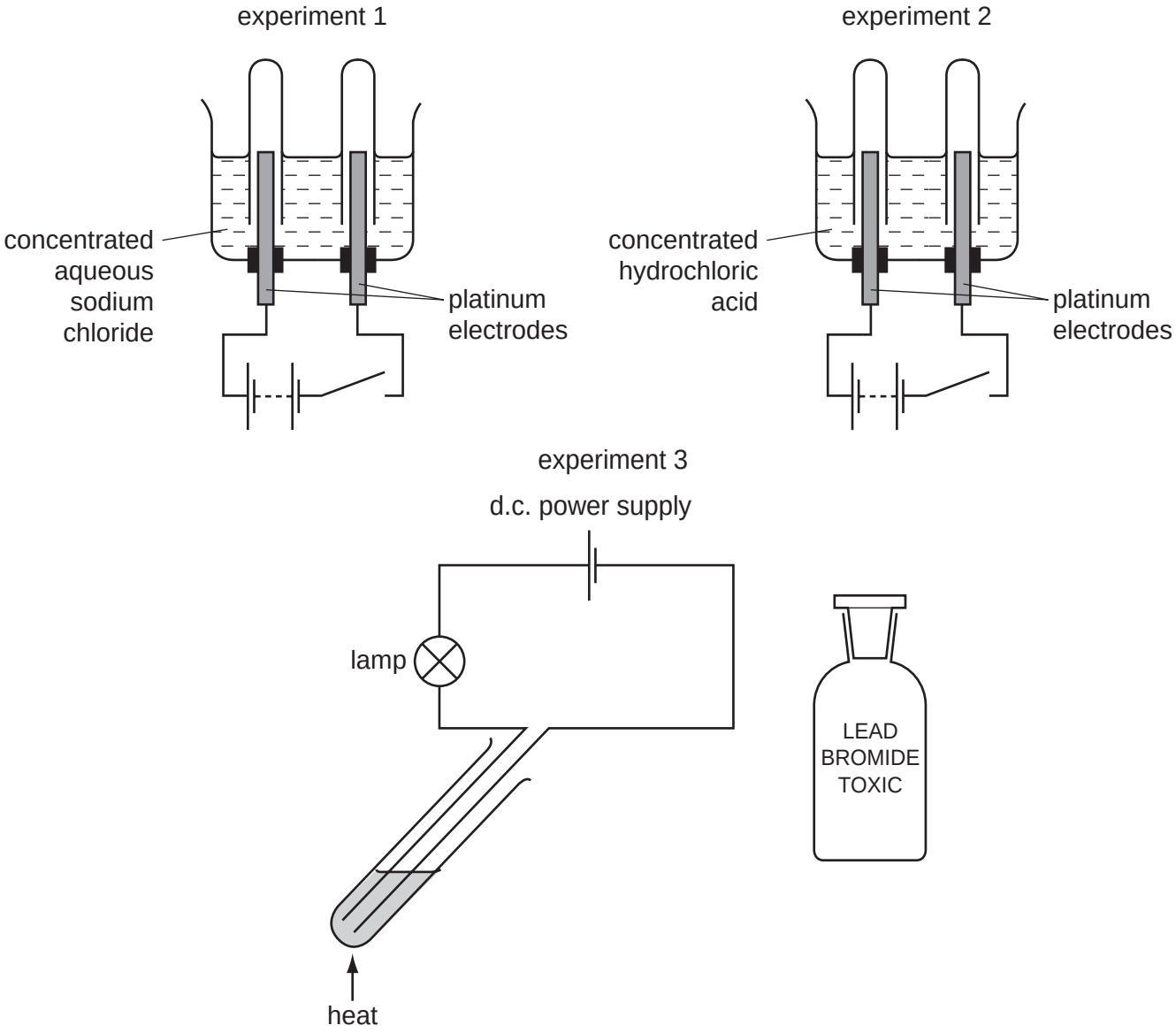
D solid sugar

30 The diagram shows an electrolysis circuit.

At which electrode is hydrogen formed?



31 Concentrated aqueous sodium chloride, concentrated hydrochloric acid and molten lead bromide were separately electrolysed in experiments 1, 2 and 3.



Which statement about the electrode products is correct?

A Gases were given off at the anode in experiments 2 and 3 only.

B Gases were given off at the cathode in experiments 1 and 2 only.

C Metals were formed at the anode in experiments 1 and 3 only.

D Metals were formed at the cathode in experiments 1 and 3 only.

32 Which metal could **not** be used for electroplating by using an aqueous solution?

A chromium

B copper

C silver

D sodium

33 Which products are formed at the electrodes when a concentrated solution of sodium chloride is electrolysed?

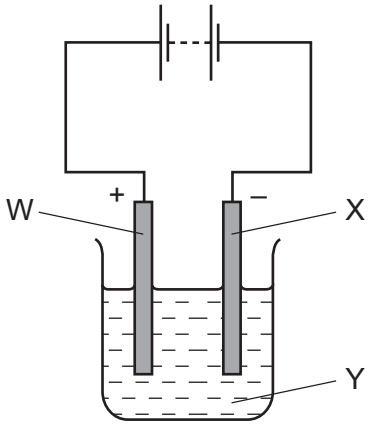
	cathode (–)	anode (+)
A	hydrogen	chlorine
B	hydrogen	oxygen
C	sodium	chlorine
D	sodium	oxygen

34 A student wishes to electroplate an object with copper.

Which row is correct?

	object is made the	a suitable electrolyte is
A	anode	CuO(s)
B	anode	$CuSO_4(aq)$
C	cathode	CuO(s)
D	cathode	$CuSO_4(aq)$

35 In the electrolysis shown, chlorine is produced at W and sodium at X.



Which labels are correct?

	W	X	Y
A	anode	cathode	NaCl (l)
B	anode	cathode	NaCl (aq)
C	cathode	anode	NaCl (l)
D	cathode	anode	NaCl (aq)

36 Which substance will **not** conduct electricity?

A aluminium

B copper

C plastic

D steel

37 Which products are formed at the anode and cathode when electricity is passed through molten lead(II) bromide?

	anode (+)	cathode (–)
A	bromide ions	lead ions
B	bromine molecules	lead atoms
C	lead atoms	bromine molecules
D	lead ions	bromide ions