

Electricity and Chemistry – 2019 June

1. 0620/11/M/J/19/No.10

Four substances are electrolysed using inert electrodes.

Which row describes the electrode products?

	substance	anode product	cathode product
A	concentrated aqueous sodium chloride	hydrogen	chlorine
B	concentrated hydrochloric acid	chlorine	oxygen
C	dilute sulfuric acid	oxygen	hydrogen
D	molten lead bromide	lead	bromine

2. 0620/12/M/J/19/No.10

Samples of dilute sulfuric acid and concentrated hydrochloric acid are separately electrolysed.

Which row describes the product at each electrode during the electrolysis of both substances?

	product at each anode	product at each cathode
A	different	different
B	different	same
C	same	different
D	same	same

3. 0620/13/M/J/19/No.10

Which substance does **not** produce a gas at both electrodes during electrolysis?

- A** concentrated aqueous sodium chloride
- B** concentrated hydrochloric acid
- C** dilute sulfuric acid
- D** molten lead(II) bromide

4. 0620/21/M/J/19/No.9

Which statement about the electrolysis of copper(II) sulfate solution using carbon electrodes is correct?

- A A colourless gas is produced at the anode.
- B A colourless gas is produced at the cathode.
- C The colour of the electrolyte remains the same.
- D The mass of both electrodes remains constant.

5. 0620/21/M/J/19/No.10

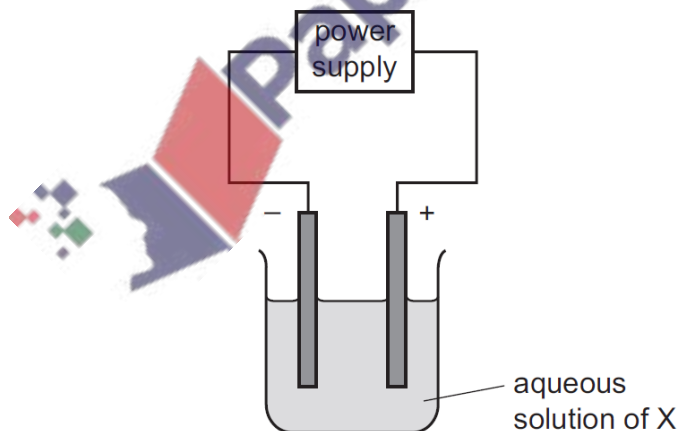
Aluminium metal is extracted from aluminium oxide by electrolysis.

Which ionic half-equation describes a reaction that occurs at the named electrode?

	ionic half-equation	electrode
A	$2\text{O}^{2-} \rightarrow \text{O}_2 + 2\text{e}^-$	anode
B	$\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$	anode
C	$2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$	cathode
D	$\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$	cathode

6. 0620/22/M/J/19/No.9

The diagram shows the electrolysis of an aqueous solution of X using inert electrodes.



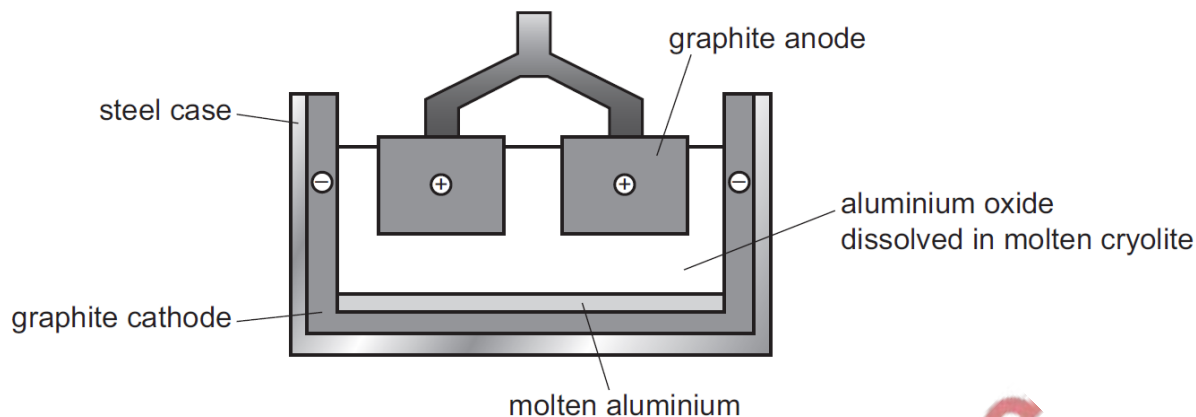
Hydrogen is produced at the cathode and chlorine is produced at the anode.

What is X?

- A concentrated copper(II) chloride solution
- B concentrated hydrochloric acid
- C dilute hydrochloric acid
- D dilute sodium chloride solution

7. 0620/22/M/J/19/No.10

Aluminium is extracted by electrolysis as shown.



Which row shows the ionic half-equations at the cathode and the anode?

	cathode	anode
A	$Al^{3+} \rightarrow Al + 3e^{-}$	$2O^{2-} \rightarrow O_2 + 4e^{-}$
B	$Al^{3+} \rightarrow Al + 3e^{-}$	$2O^{2-} + 4e^{-} \rightarrow O_2$
C	$Al^{3+} + 3e^{-} \rightarrow Al$	$2O^{2-} \rightarrow O_2 + 4e^{-}$
D	$Al^{3+} + 3e^{-} \rightarrow Al$	$2O^{2-} + 4e^{-} \rightarrow O_2$

8. 0620/23/M/J/19/No.10

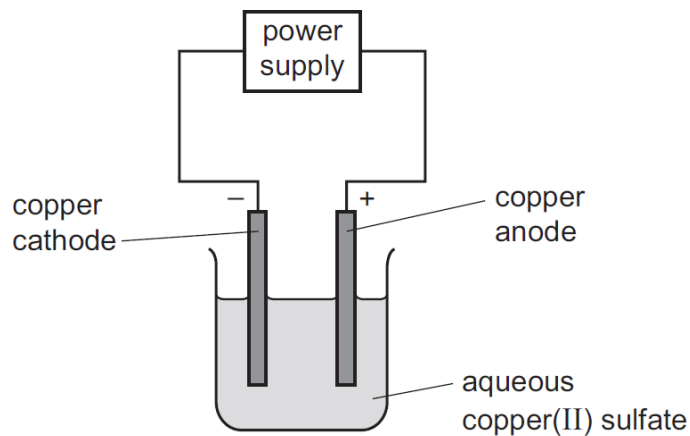
In the manufacture of aluminium by electrolysis, aluminium oxide is dissolved in molten cryolite.

Why is cryolite used?

- A** It lowers the melting point of the aluminium.
- B** It makes the aluminium a better conductor.
- C** It removes impurities from the aluminium.
- D** The mixture has a lower melting point than pure aluminium oxide.

9. 0620/23/M/J/19/No.9

An aqueous solution of copper(II) sulfate was electrolysed using copper electrodes.



Which equation for the reaction at the anode is correct?

- A $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$
- B $\text{Cu} + 2\text{e}^- \rightarrow \text{Cu}^{2+}$
- C $\text{Cu}^{2+} \rightarrow \text{Cu} + 2\text{e}^-$
- D $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$

10. 0620/22/F/M/19/No.10

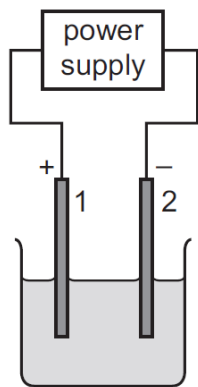
Which substance is **not** produced during the electrolysis of concentrated aqueous sodium chloride?

- A chlorine
- B hydrogen
- C sodium
- D sodium hydroxide

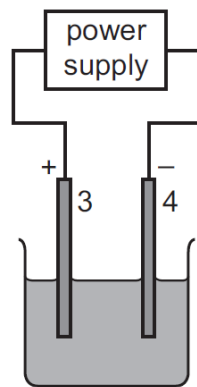
11. 0620/12/F/M/19/No.10

Two electrolysis experiments were carried out as shown.

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

12. 0620/22/F/M/19/No.11

Aqueous copper(II) sulfate is electrolysed using copper electrodes.

What are the ionic half-equations for the reactions that occur at each electrode?

	anode	cathode
A	$\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$	$\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$
B	$\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$	$\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$
C	$4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$	$\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$
D	$4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$	$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$