Electricity and Chemistry – 2021 IGCSE 0620

1. June/2021/Paper_11,12,13,21,22&23/No.10

In separate experiments, electricity was passed through concentrated aqueous sodium chloride and molten lead(II) 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.

2. June/2021/Paper_11/No.11

Steel core aluminium cables are used for overhead electricity cables.

Which statement explains why these cables are used?

A Aluminium conducts electricity only when it surrounds a steel core.

B Aluminium conducts electricity and the steel core makes the cable stronger.

C Steel conducts electricity and is surrounded by aluminium because aluminium is an insulator.

D Steel conducts electricity and is surrounded by aluminium to stop the steel from corroding.

3. June/2021/Paper_21/No.11

What is the ionic half-equation for the reaction that occurs at the cathode when molten lead(II) bromide is electrolysed?

A $Pb^{2+} + 2e^- \rightarrow Pb$

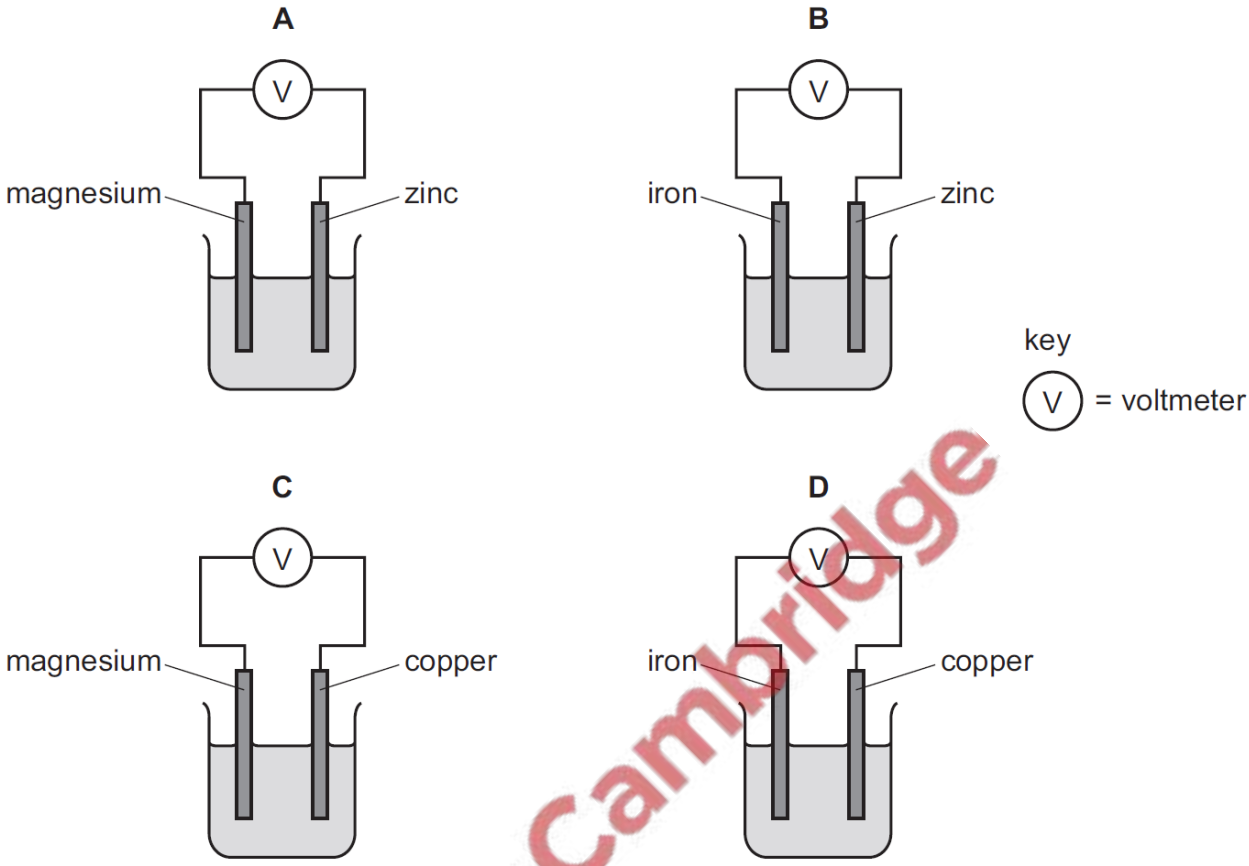
B $2Br^- \rightarrow Br_2 + 2e^-$

C $Br_2 + 2e^- \rightarrow 2Br^-$

D $Pb \rightarrow Pb^{2+} + 2e^-$

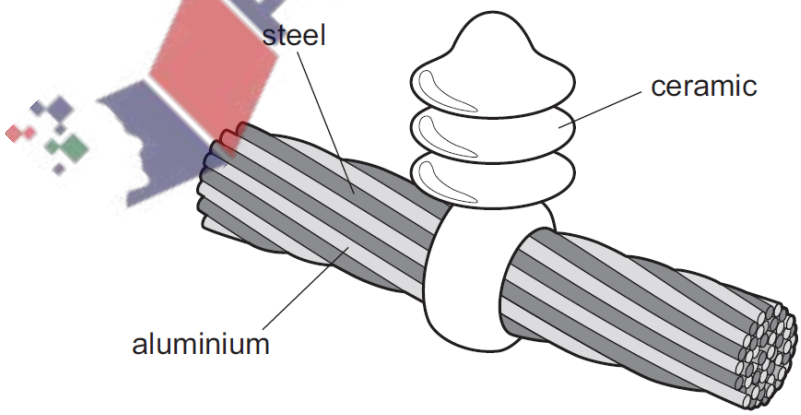
4. June/2021/Paper_23/No.13

Which simple cell produces the most electrical energy?



5. March/2021/Paper_12&22/No.11

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 Ceramic is a good conductor of electricity.

C Steel can rust in damp air.

D Steel is more dense than aluminium.

6. March/2021/Paper_12/No.12

Three substances are electrolysed using inert electrodes.

Which substances produce hydrogen at the negative electrode?

1 concentrated hydrochloric acid

2 concentrated aqueous sodium chloride

3 dilute sulfuric acid

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

7. March/2021/Paper_22/No.9

The ionic half-equation for the formation of oxygen during the electrolysis of aluminium oxide is shown.

$$x O^{2-} \rightarrow O_2 + y e^-$$

What are the values of *x* and *y*?

	x	*y*
A	1	2
B	1	4
C	2	2
D	2	4

8. March/2021/Paper_22/No.12

During the electrolysis of dilute sulfuric acid, hydrogen is collected at the cathode.

What is the ionic half-equation for this reaction?

A $H^+ + e^- \rightarrow H$

B $H^+ \rightarrow H + e^-$

C $2H^+ + 2e^- \rightarrow H_2$

D $2H^+ \rightarrow H_2 + 2e^-$

9. June/2021/Paper_31/No.7

(a) Molten lead(II) bromide is electrolysed using carbon electrodes.

(i) State the products of this electrolysis at:

the negative electrode .....

the positive electrode. .....

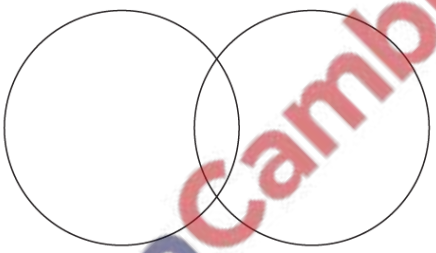
[2]

(ii) State the name of **another** substance which can be used as an inert electrode.

..... [1]

(b) When aqueous magnesium chloride is electrolysed using carbon electrodes, hydrogen gas is produced at the negative electrode.

Complete the dot-and-cross diagram to show the electron arrangement in one molecule of hydrogen.



[1]

[Total: 4]

10. June/2021/Paper_33/No.7

Concentrated hydrochloric acid is electrolysed using carbon electrodes.

(a) State the products of this electrolysis at:

the negative electrode .....

the positive electrode. .....

[2]

(b) Name a metal that can be used as an inert electrode instead of carbon.

..... [1]

(c) When dilute sulfuric acid is electrolysed, oxygen is produced at the positive electrode.

(i) Describe the separation and motion of the molecules in oxygen gas.

separation .....

.....

motion .....

.....

[2]

(ii) Describe a test for oxygen.

test .....

observations .....

[2]

[Total: 7]

11. June/2021/Paper_41/No.3

Potassium reacts with chlorine to form potassium chloride, KC*l*.

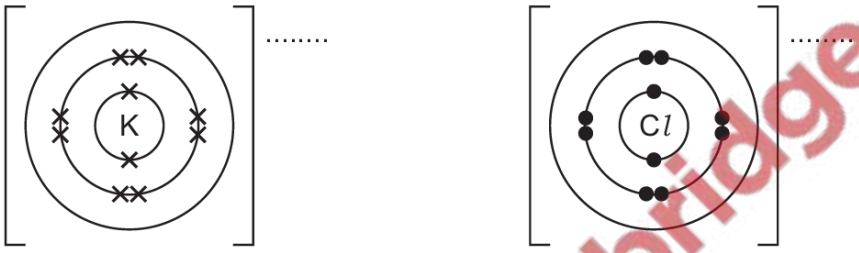
(a) Write a chemical equation for this reaction.

..... [2]

(b) Potassium chloride is an ionic compound.

Complete the diagram to show the electron arrangement in the outer shells of the ions present in potassium chloride.

Give the charges on both ions.



....

[3]

(c) Molten potassium chloride undergoes electrolysis.

(i) State what is meant by the term *electrolysis*.

.....

..... [2]

(ii) Name the products formed at the positive electrode (anode) and negative electrode (cathode) when molten potassium chloride undergoes electrolysis.

anode .....

cathode .....

[2]

(d) Concentrated aqueous potassium chloride undergoes electrolysis.

(i) Write an ionic half-equation for the reaction at the negative electrode (cathode).

..... [2]

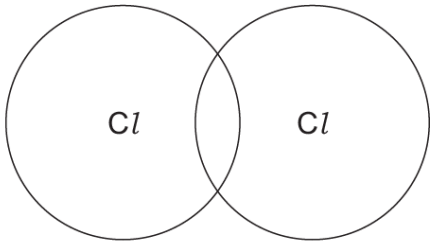
(ii) Name the product formed at the positive electrode (anode).

..... [1]

(iii) Name the potassium compound that remains in the solution after electrolysis.

..... [1]

(e) Complete the dot-and-cross diagram to show the electron arrangement in a molecule of chlorine, Cl_2.
Show the outer electrons only.



[1]

(f) The melting points and boiling points of chlorine and potassium chloride are shown.

	melting point / °C	boiling point / °C
chlorine	–101	–35
potassium chloride	770	1500

(i) Deduce the physical state of chlorine at –75 °C. Use the data in the table to explain your answer.

physical state .....

explanation .....

.....

[2]

(ii) Explain, in terms of structure and bonding, why potassium chloride has a much higher melting point than chlorine.

Your answer should refer to the:

- types of particle held together by the forces of attraction
- types of forces of attraction between particles
- relative strength of the forces of attraction.

.....

.....

.....

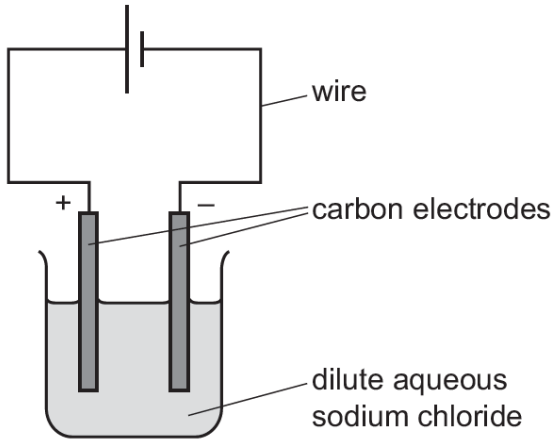
.....

..... [3]

[Total: 19]

12. June/2021/Paper_42/No.4

A student carries out an electrolysis experiment using the apparatus shown.



The student uses dilute aqueous sodium chloride.

(a) State the name given to any solution which undergoes electrolysis.

..... [1]

(b) Hydroxide ions are discharged at the anode.

(i) Complete the ionic half-equation for this reaction.

.....$OH^-(aq)$ → ..... + $O_2(g)$ + $4e^-$ [2]

(ii) Explain how the ionic half-equation shows the hydroxide ions are being oxidised.

..... [1]

(c) Describe what the student observes at the cathode.

..... [1]

(d) Write the ionic half-equation for the reaction at the cathode.

..... [2]

(e) The student repeats the experiment using concentrated aqueous sodium chloride.

(i) Describe what the student observes at:

- the cathode .....
- the anode. .....

[2]

(ii) The student added litmus to the solution after the electrolysis of concentrated aqueous sodium chloride.

State the colour seen in the solution. Give a reason for your answer.

colour of solution .....

reason .....

[2]

(f) Carbon electrodes are used because they are inert.

State another element that can be used instead of carbon.

..... [1]

[Total: 12]