

Paper 3

Questions are applicable for both core and extended candidates

1 The chemical elements are arranged in the Periodic Table in groups and periods.

(c) Molten silver bromide is electrolysed using graphite electrodes.

Name the product formed at each electrode.

product at the anode

product at the cathode

[2]

(d) Fig. 3.2 shows the apparatus used to electroplate a metal object with silver.

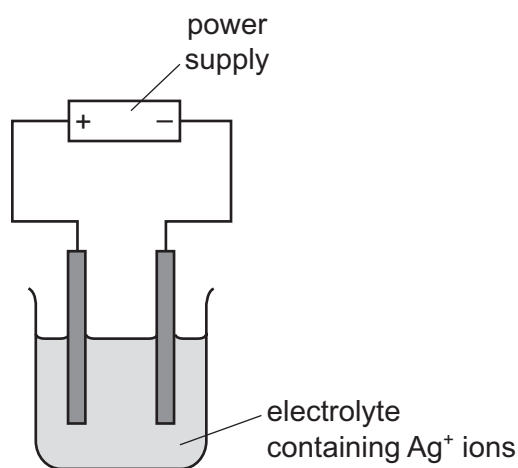


Fig. 3.2

(i) Label Fig. 3.2 to show where the silver is deposited.

[1]

(ii) State why objects are electroplated.

..... [1]

2 Potassium iodide is an ionic compound.

(b) Molten potassium iodide is electrolysed using graphite electrodes.

(i) Name the products formed at the positive and negative electrodes.

positive electrode

negative electrode

[2]

(ii) State the name of the positive electrode in an electrolysis experiment.

..... [1]

3 This question is about sulfur and compounds of sulfur.

(d) Fig. 4.2 shows the apparatus used for the electrolysis of dilute sulfuric acid using graphite electrodes.

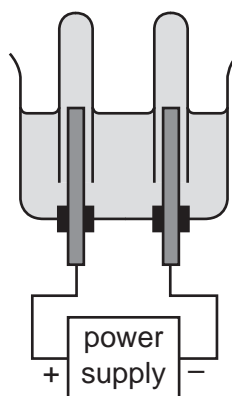


Fig. 4.2

(i) Label Fig. 4.2 to show:

- the cathode
- the electrolyte.

[2]

(ii) Name the products and state the observations at the positive and negative electrodes.

product at the positive electrode

.....

observations at the positive electrode

.....

product at the negative electrode

.....

observations at the negative electrode

.....

[4]

4 Lithium bromide is a compound with ionic bonding.

(d) Molten lithium bromide is electrolysed using graphite electrodes.

State the names of the product at each electrode and give the observations at the positive electrode.

product at the negative electrode

product at the positive electrode

observations at the positive electrode

.....

[3]

5 Table 5.1 shows the properties of four substances.

Table 5.1

substance	boiling point	electrical conductivity of solid	electrical conductivity when molten	density in g / cm ³
aluminium	high	conducts	conducts	2.70
diamond				3.51
potassium bromide	high	does not conduct	conducts	2.75
sulfur	low	does not conduct		2.07

(e) Molten potassium bromide can be electrolysed.

Predict the products of this electrolysis at:

the anode

the cathode.

[2]

6 (c) Lithium is extracted by the electrolysis of molten lithium chloride.

(i) Name a non-metal used to make the electrodes.

..... [1]

(ii) Give one property, **other** than the conduction of electricity, that makes this substance suitable for use as an electrode.

..... [1]

(iii) State the products of the electrolysis of molten lithium chloride at:

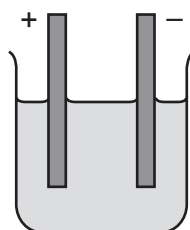
the negative electrode (cathode)

the positive electrode (anode).

[2]

7 This question is about zinc and compounds of zinc.

(c) Molten zinc chloride is electrolysed.
The incomplete apparatus is shown.



(i) Complete the diagram by:

- completing the circuit to show the wires and power pack
- labelling the anode.

[2]

(ii) Name the products formed at each electrode.

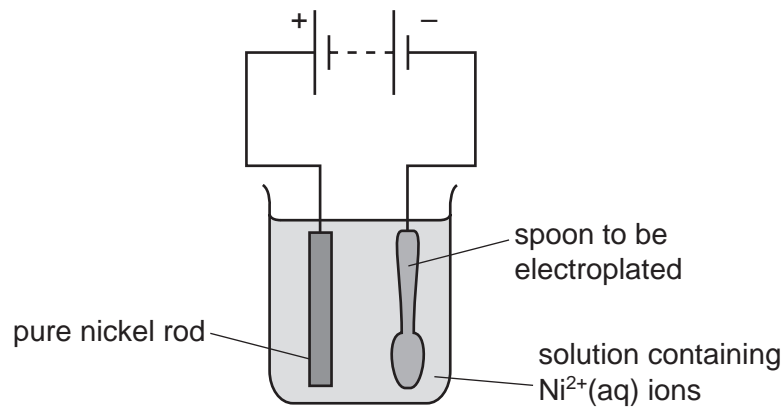
positive electrode

negative electrode

[2]

8 This question is about metals.

- (b) A steel spoon can be electroplated with nickel.
The apparatus is shown.



- (i) Choose a word from the list which describes the nickel rod.

Draw a circle around your answer.

anion

anode

cathode

cation

electrolyte

[1]

- (ii) Describe the observations made during this electroplating at the:

pure nickel rod

.....

spoon.

.....

[2]

- (iii) State **one** reason for electroplating an object.

..... [1]

Paper 4

**Questions are applicable for both core and extended candidates
unless indicated in the question**

9 This question is about electricity and chemical reactions.

- (a) The electrolysis of concentrated aqueous potassium bromide using graphite electrodes forms:
- hydrogen at the cathode
 - bromine at the anode.

The electrolyte becomes aqueous potassium hydroxide.

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

.....
 [2]

- (ii) State why graphite is suitable for use as an electrode.

..... [1]

- (iii) Write an ionic half-equation for the formation of hydrogen at the cathode. **(extended only)**

..... [2]

- (iv) Name the type of particle responsible for the transfer of charge in the conducting wires.

(extended only)

..... [1]

- (v) Name the type of particle responsible for the transfer of charge in aqueous potassium bromide. **(extended only)**

..... [1]

- (vi) State the names of the products formed when electricity is passed through **dilute** aqueous potassium bromide using graphite electrodes. **(extended only)**

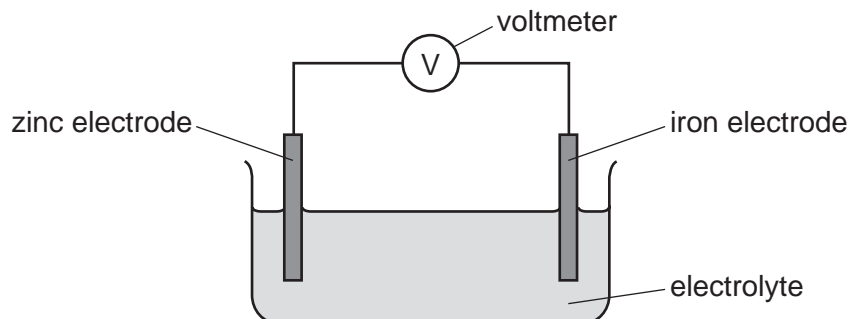
at the anode

at the cathode.....

[2]

10 This question is about chemical reactions and electricity.

(a) The diagram shows the apparatus used in the production of electrical energy in a simple cell.



The zinc electrode dissolves in the electrolyte forming $\text{Zn}^{2+}(\text{aq})$ ions.

(i) Draw an arrow on the diagram to show the direction of electron flow. **(extended only)** [1]

(ii) Write the ionic half-equation for the reaction that occurs when the zinc electrode dissolves.

(extended only)

..... [2]

(b) The reading on the voltmeter can be increased if either zinc or iron is replaced by another metal.

(i) Name a metal that can replace zinc and increase the reading on the voltmeter.

..... [1]

(ii) Name a metal that can replace iron and increase the reading on the voltmeter.

..... [1]

(c) Fuel cells are used to generate electricity.

(i) Name the reactants in a fuel cell.

..... [1]

(ii) Name the waste product of a fuel cell.

..... [1]

(d) Electricity can be used to break down aqueous or molten ionic compounds.

(i) Name the process which uses electricity to break down aqueous or molten ionic compounds.

..... [1]

(ii) Explain why the ionic compound needs to be aqueous or molten.

..... [1]

(e) Brine is concentrated aqueous sodium chloride. **(extended only)**

(i) Name **three** substances which are manufactured by passing electricity through brine.

1

2

3

[3]

(ii) Name a different substance formed when molten sodium chloride is used instead of concentrated aqueous sodium chloride.

..... [1]

[Total: 13]