

GCSE Combined Science: Trilogy

Worksheet: The process of electrolysis

TIME 35 min	TOTAL 31 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: The process of electrolysis

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Electrolysis uses an electric current to break down ionic compounds.

0 1 . 1

What name is given to a liquid or solution that conducts electricity and is broken down by electrolysis?

[1 mark]

0 1 . 2

Solid sodium chloride does not conduct electricity. Molten sodium chloride does conduct electricity.
Explain why.

[2 marks]

0 1 . 3

Which electrode do positive ions move towards during electrolysis?

Tick (✓) **one** box.

the anode

☐

the cathode

☐

both electrodes

☐

neither electrode

☐

[1 mark]

0 2

0 2 . 1

Define electrolysis.

.....

.....

[1 mark]

0 2 . 2

Which substance can be electrolysed?

Tick (✓) **one** box.

Solid sodium chloride

☐

Molten sodium chloride

☐

Molten sulfur

☐

Solid copper

☐

[1 mark]

0 3

An electrolysis circuit contains a power supply, connecting wires, and two electrodes dipped into the electrolyte.

0 3 . 1

State the type of power supply that must be used for electrolysis, and explain why alternating current (like mains electricity) is not suitable.

.....

.....

.....

.....

[2 marks]

0 3 . 2

Name the electrode connected to the positive terminal of the power supply.

.....

.....

.....

.....

[1 mark]

0 4

A student says: 'All liquids conduct electricity and can be electrolysed.'

0 4 . 1

Evaluate this statement, using molten wax (a covalent substance with no ions) as an example.

.....

.....

.....

.....

[2 marks]

0 4 . 2

State the type of substance that can be electrolysed when molten or dissolved.

.....

.....

[1 mark]

0 5

Solid sodium chloride does not conduct electricity, but molten sodium chloride does.

0 5 . 1

Explain, in terms of ions, why solid sodium chloride cannot conduct electricity or be electrolysed.

.....

.....

[1 mark]

0 5 . 2

Explain why melting sodium chloride allows it to conduct electricity.

.....

.....

.....

.....

[2 marks]

0 6

The two electrodes used in electrolysis are called the cathode and the anode.

0 6 . 1

State which electrode, the cathode or the anode, is connected to the negative terminal of the power supply.

.....

.....

[1 mark]

0 6 . 2

State which type of ion moves towards the cathode, and explain why.

.....

.....

.....

.....

[2 marks]

0 7

Molten potassium iodide, KI, is electrolysed using inert electrodes.

0 7 . 1

Name the product formed at the negative electrode, and the product formed at the positive electrode.

.....

.....

.....

.....

[2 marks]

0 7 . 2

Explain why potassium, not iodine, forms at the negative electrode.

.....

.....

[1 mark]

0 8

Some substances conduct electricity and some do not.

0 8 . 1

Which **two** substances are electrolytes?

Tick (✓) **two** boxes.

Solid potassium iodide

☐

Molten potassium iodide

☐

Potassium iodide solution

☐

Sugar solution

☐

Copper metal

☐

[2 marks]

0 8 . 2

Copper metal conducts electricity but it is not an electrolyte.
Explain why.

.....

.....

.....

.....

[2 marks]

0 8 . 3

Explain why sugar solution does not conduct electricity.

.....

.....

[1 mark]

0 9

A student electrolysed molten zinc chloride, ZnCl_2 , using inert electrodes.

0 9 . 1

Give the name of the positive electrode.

.....

.....

.....

[1 mark]

0 9 . 2

Which ions move towards the positive electrode? Explain why.

.....

.....

.....

.....

[2 marks]

0 9 . 3

What is meant by an inert electrode?

.....

.....

[1 mark]

0 9 . 4

Describe what happens to the ions when they reach the electrodes.

.....

.....

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: The process of electrolysis · 31 marks

Question 1 (4 marks)

01.1 [1 mark]

Answer: electrolyte

- electrolyte (1)
-

01.2 [2 marks]

- in the solid the ions are held in fixed positions / cannot move (1)
- when molten the ions are free to move (and carry charge) (1)

Notes: Do not accept references to electrons moving for either mark.

01.3 [1 mark]

Correct: the cathode

Question 2 (2 marks)

02.1 [1 mark]

- the use of electricity to break down (decompose) an ionic compound (an electrolyte) into its elements (1)
-

02.2 [1 mark]

Correct: Molten sodium chloride

Question 3 (3 marks)

03.1 [2 marks]

- a direct current (d.c.) power supply must be used (1)
 - alternating current would repeatedly reverse which electrode is positive and negative, preventing net movement of ions and stopping any product forming (1)
-

03.2 [1 mark]

Answer: the anode

- the anode (1)
-

Question 4 (3 marks)

04.1 [2 marks]

- molten wax is a liquid but it contains no ions / charged particles that can move (1)
- so it cannot conduct electricity or be broken down by electrolysis, which shows the statement is wrong (1)

Notes: 'The statement is wrong' on its own scores 0.

04.2 [1 mark]

Answer: an ionic compound

- an ionic compound (1)
-

Question 5 (3 marks)

05.1 [1 mark]

- in a solid, the ions are held in fixed positions in the lattice (by strong ionic bonds) and cannot move (1)

05.2 [2 marks]

- melting breaks down the rigid lattice structure, freeing the ions to move throughout the liquid (1)
 - the moving charged ions can carry electric current (and move to the electrodes) (1)
-

Question 6 (3 marks)

06.1 [1 mark]

Answer: the cathode

- the cathode (1)
-

06.2 [2 marks]

- cations (positive ions) (1)
 - they are attracted to the negative electrode, because opposite charges attract (1)
-

Question 7 (3 marks)

07.1 [2 marks]

Answer: potassium (negative electrode); iodine (positive electrode)

- potassium (at the negative electrode) (1)
 - iodine (at the positive electrode) (1)
-

07.2 [1 mark]

- potassium ions (K^+ , positive ions) move to the negative electrode, where they gain electrons to form potassium atoms (1)
-

Question 8 (5 marks)

08.1 [2 marks]

Correct: Molten potassium iodide; Potassium iodide solution

08.2 [2 marks]

- copper conducts because it has delocalised electrons that move through the metal (1)
 - copper is not an ionic compound / has no ions that move, so it is not decomposed by the current (1)
-

08.3 [1 mark]

- sugar is made of (covalent) molecules, so there are no ions to move and carry the charge (1)
-

Question 9 (5 marks)

09.1 [1 mark]

Answer: anode

- anode (1)
-

09.2 [2 marks]

- chloride ions / Cl^- (1)
 - they are negatively charged so are attracted to the positive electrode (1)
-

09.3 [1 mark]

- an electrode that does not react (with the electrolyte or the products) (1)
-

09.4 [1 mark]

- they are discharged: they gain or lose electrons to form atoms / molecules (elements) (1)
-