

BioMedical Admissions Test (BMAT)

Section 2: Chemistry

Questions by Topic

C12 - Electrolysis

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C12: Electrolysis - Question by Topic

(Mark Scheme and explanations at the end)

- 1 A student wishes to electroplate a silver chain with gold.

What should the arrangement of electrodes be?

- A Chain at anode, gold at cathode, electrolyte solution of gold ions
- B Chain at anode, gold at cathode, electrolyte solution of sodium chloride
- C Chain at cathode, gold at anode, electrolyte solution of gold ions
- D Chain at cathode, gold at anode, electrolyte solution of sodium chloride
- E Chain at cathode, copper at anode, electrolyte solution of gold ions
- F Chain at anode, copper at cathode, electrolyte solution of sodium chloride

- 2 Impure copper can be purified by electrolysis.

What is the electrolyte in this process, and, when aqueous NaOH is added to the electrolyte, what colour is observed?

- A Copper carbonate, light blue
- B Copper carbonate, yellow
- C Water, yellow
- D Copper sulfate, light blue
- E Copper sulfate, green





3 A chemist wishes to set up an electrolysis chamber with an iron cathode. However, she would like to ensure that the iron cathode does not corrode over time. Which of the following are **not** valid method(s) to do so?

- 1 Galvanising the iron cathode in gold.
- 2 Connecting a secondary anode next to the iron cathode, made of magnesium.
- 3 Use a solid electrolyte when performing the electrolysis.

- A All of the above.
B 1 and 3 only
C 2 only
D 1 and 2 only
E 1 only
F 2 and 3 only

4 A scientist sets up electrolysis experiment 1 with molten Sodium Chloride and electrolysis experiment 2 with aqueous Sodium Chloride.

Which of the following lines in the table correctly describes the products of each reaction?

	Experiment 1 - Anode	Experiment 1 - Cathode	Experiment 2 - Anode	Experiment 2 - Cathode
A	Sodium	Chlorine	Hydrogen	Chlorine
B	Chlorine	Sodium	Chloride	Sodium
C	Chlorine	Hydrogen	Chlorine	Hydrogen
D	Chlorine	Sodium	Chlorine	Hydrogen
E	Chlorine	Hydrogen	Chlorine	Sodium





5 Which line of the table correctly defines each of the terms?

	Anode	Cathode	Anion	Cation
A	The positive electrode	The negative electrode	A negative ion	A positive ion
B	The negative electrode	The positive electrode	A negative ion	A positive ion
C	The negative electrode	The positive electrode	A positive ion	A negative ion
D	The positive electrode	The negative electrode	A positive ion	A negative ion



Answers and Explanations

1 The answer is C

Gold ions in the solution move towards the negative cathode (chain) and are reduced to metallic gold. This covers the chain, electroplating it. Oxidation at the positive gold anode dissolves it, replenishing the solution with gold ions.

2 The answer is D

Copper sulfate is used in this process as the electrolyte. Copper ions from the impure copper at the anode are liberated, meaning that if aqueous NaOH is added, a light blue precipitate of $\text{Cu}(\text{OH})_2$ is formed in solution.

3 The answer is B

Only statement 2 is correct.

Statement 1 **incorrect.** Galvanising the electrode would work but only if it is done with a more reactive metal, such as zinc. Gold is less reactive than iron, so it would not corrode first and would not protect the iron.

Statement 2 **is known as sacrificial corrosion**, and placing a more reactive metal next to a less reactive metal is a recognised method of protecting the less reactive metal from corrosion.

Statement 3 **is incorrect** - electrolytes must be molten or in solution to ensure the flow of ions, which can carry a current through the cell.

4 The answer is D

Experiment 1 is of **molten** NaCl. This means that the products will be sodium at the cathode and chlorine at the anode. Experiment 2 is of **aqueous** NaCl. As sodium is **more** reactive than hydrogen, hydrogen gas forms at the cathode and chlorine at the anode. This is option D.

5 The answer is A

This is the only line with the definitions in the correct order. For a few more helpful electrolysis definitions, look at the **Chemistry Topic 12 guide**.

