

## C2 Electrolysis Quiz

1. Write a half equation for the formation of chlorine gas from chloride ions.



2. Write a half equation for the formation of hydrogen gas from hydrogen ions.



3. Write a half equation for the formation of oxygen gas from oxide ions.



4. Write a half equation for the formation of aluminium from aluminium ions.



5. Why is the formation of chlorine from chloride ions classed as oxidation?

Each chloride ion loses an electron.

6. Why is the formation of sodium from sodium ions classed as reduction?

Because each sodium ion gains an electron.

7. What is an electrolyte?

The substance that is to be electrolysed. Molten ionic substance or ionic solution.

8. What is electrolysis?

Decomposing a compound using electricity.

9. Why do chloride ions move to the anode?

Chloride ions (anions) are negatively charged, the anode is positively charged; opposites attract.

10. Why do hydrogen ions move to the cathode?

Hydrogen ions (cations) are positively charged and move to the negatively charged cathode because opposites attract.

11. How can you plate a spoon in silver?

Make the spoon the cathode. Use a silver anode and silver nitrate electrolyte. Silver atoms from the anode lose an electron each and join the electrolyte. The electrons travel via the external circuit to the cathode. The silver ions move through the electrolyte to the cathode where they gain one electron each and form silver atoms.

12. During the electrolysis of brine hydrogen is produced at the cathode instead of sodium. Why?

Sodium is more reactive than hydrogen so the sodium ions will stay in solution.

13. During electrolysis, which particles carry the electric current through the solution and which particles carry the current through the external wire?

Ions carry the current through the solution and electrons carry the current through the wire.

14. During the electrolysis of brine, what are the three products? What are they used for?

Hydrogen gas is produced at the cathode. Hydrogen is used to make ammonia. Chlorine is produced at the anode. Chlorine is added to water to disinfect the water. Sodium hydroxide solution is left behind. This is used to make soap or paper

15. Why does electrolysis of solid KBr not work?

The ions are not free to move in solid KBr.

16. Describe the electrolysis of brine.

Graphite electrodes and sodium chloride solution as electrolyte. Hydrogen ions travel to the cathode where they gain an electron each, pair up and form  $H_2$  molecules. Chloride ions travel to the anode where they lose one electron each, pair up and form  $Cl_2$  molecules.  $Na^+$  and  $OH^-$  ions are left behind in solution.

17. Describe the electrolysis of molten aluminium oxide.

Cryolite is added to the mix to reduce the melting point and save energy. Graphite electrodes are used. Aluminium cations move to the cathode to gain 3 electrons each and form aluminium atoms. Oxide ions travel to anode to lose 2 electrons each, pair up and form oxygen molecules and react with the anode to make  $CO_2$ . Anodes need to be replaced periodically as a result

18. Describe how you would produce pure copper from a lump of impure copper.

Use impure copper as anode. Use pure copper as cathode. Use copper sulphate as electrolyte. Copper atoms from anode lose 2 electrons each, form copper ions and join electrolyte. Electrons travel through two electrons each, form copper atoms and join the cathode.