

Chemical change

Reading: pages 51-59

Knowledge

1. Which ion makes a solution acidic?
2. What is a 'strong' acid?
3. What makes one metal more reactive than another?
4. What is the ionic equation for neutralisation?
5. What happens to the H⁺ ion concentration when the pH decreases by 1 unit?
6. What are the two definitions for 'reduction'?
7. What does a 'redox' reaction involve?
8. What is 'electrolysis'?
9. Why do some metals have to be extracted using electrolysis?
10. Which ions are contained in water?
11. What is the name of the negative electrode? Positive electrode?
12. What are the two definitions for oxidation?

Application

1. Write an equation to represent the reduction of iron (III) oxide (Fe₂O₃) by carbon. Identify which species is oxidised and which is reduced.

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2. Explain why the electrolysis of sodium chloride has to be conducted at high temperatures

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3. Complete the table to describe the test and positive results for the gases given

Gas	How to do the test	Positive result
Hydrogen		
Oxygen		
Chlorine		

4. Some reactions of metals are given below:

Metal	Observations when placed in water	Observations when placed in acid
Calcium	Bubbles of gas, heat given out	Heat and hydrogen given off.
Lithium	Fizzes energetically, heat given out, metal moves around the surface	Large amounts of hydrogen and heat, can explode
Iron	Does not react	Reacts slowly
Potassium	Bursts into flame	Extremely explosive
Magnesium	Does not react	Reacts energetically
Sodium	Fizzes energetically, enough gas given off that it can be lit	Explosive

Use the information above to order the metals from highest reactivity to lowest.

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5. Explain why, during the electrolysis of sodium chloride solution, hydrogen is given off at the cathode and not sodium.

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6. Draw and label the diagram to show the electrolysis of Aluminium oxide.

7. Why is cryolite added to the aluminium oxide before heating?

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8. Describe what happens to the aluminium ions and the oxide ions during the electrolysis. Include the half equations.

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Extend

1. For the electrolysis of the solution copper sulphate, write the half equations for the reaction at the:

Cathode

Anode