

## Chemical changes

Explain what will happen when an aqueous solution of sodium chloride is electrolysed.

Electrolysis of aqueous solutions

## Chemical changes

What happens at the cathode (negative electrode) during electrolysis?

Reactions at electrodes as half equations (HT).

## Chemical changes

What type of reaction occurs at the cathode (negative electrode)?

Reactions at electrodes as half equations (HT).

## Chemical changes

What happens at the anode (positive electrode) during electrolysis?

Reactions at electrodes as half equations (HT).

## Chemical changes

What type of reaction occurs at the anode (positive electrode)?

Reactions at electrodes as half equations (HT).

## Chemical changes

Write out the half equations for the electrolysis of copper sulfate solution.

Reactions at electrodes as half equations (HT).

## Chemical changes

Write out the half equations for the electrolysis of sodium chloride solution.

Reactions at electrodes as half equations (HT).

## Energy changes

What happens to energy in chemical reactions?

Exothermic and endothermic reactions

## Energy changes

Compare the energy in the reactants and the products if energy is transferred to the surroundings during the reaction.

Exothermic and endothermic reactions

## Energy changes

Compare the energy in the reactants and the products if energy is transferred from the surroundings during the reaction.

Exothermic and endothermic reactions

Positive metal ions or hydrogen gain electrons.

Sodium is more reactive than hydrogen so copper is formed at the negative electrode (cathode). As there are halide ions present in solution (the chloride ions) chlorine gas will be given off at the positive electrode (anode).

Negative non-metal ions lose electrons

Reduction.

At the negative electrode (cathode):  $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ . At the positive electrode (anode):  $4\text{OH}^- \rightarrow \text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^-$ .

Oxidation.

Energy is concerned in chemical reactions.

At the negative electrode (cathode):  $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$ . At the positive electrode (anode):  $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$ .

The reactant molecules have less energy than the product molecules.

The product molecules have less energy than the reactant molecules.

## Energy changes

What reaction occurs when bonds are made?

The energy changes of reactions (HT)

## Energy changes

How do you calculate the overall energy change for a reaction?

The energy changes of reactions (HT)

## Energy changes

What is the overall energy change for an exothermic reaction?

The energy changes of reactions (HT)

## Energy changes

What is the overall energy change for an endothermic reaction?

The energy changes of reactions (HT)

## The rate and extent of chemical change

How do you measure the rate of a chemical reaction?

Calculating rates of reaction

## The rate and extent of chemical change

What is the formula to calculate measure the mean rate of reaction from the reactants?

Calculating rates of reaction

## The rate and extent of chemical change

What is the formula to calculate the mean rate of reaction from the products?

Calculating rates of reaction

## The rate and extent of chemical change

What three quantities can be used to measure the the quantity of the product or reactant?

Calculating rates of reaction

## The rate and extent of chemical change

What are the units for rate of reaction?

Calculating rates of reaction

## The rate and extent of chemical change

What is a tangent?

Calculating rates of reaction

Combustion, oxidation reactions and neutralisation reactions.

A reaction that transfers energy to the surroundings, increasing the temperature of the surroundings.

Thermal decomposition, the reaction between citric acid and sodium hydrogencarbonate and some sports injury packs.

A reaction that transfers energy from the surroundings, decreasing the temperature of the surroundings.

The minimum amount of energy the particles must have for a reaction to take place.

A chemical reaction occurs when particles collide with each with sufficient energy.

Energy needs to be supplied to break bonds in the reactants. Energy is released when bonds in the products are formed.

A graph to show the change in energy between reactants and products over the course of a reaction.

Endothermic

The energy needed to break or form bonds between atoms.