OCR (A) Chemistry A-level

Topic 3.2.1- Enthalpy changes

Flashcards

What does system mean in a chemical reaction?

What does system mean in a chemical reaction?

The atoms and bonds involved in the chemical reaction

Explain the law of conservation

Explain the law of conservation

The amount of energy in an isolated system remains the same. Energy cannot be destroyed or created, It can only be transferred from one form to another

What energy change is breaking bonds associated with?

What energy change is breaking bonds associated with?

Energy is taken in to break bonds → endothermic reaction

What energy change is making bonds associated with?

What energy change is making bonds associated with?

Energy is released to make bonds → exothermic reaction

What is an endothermic reaction?

What is an endothermic reaction?

A reaction with an overall positive enthalpy change ($+\Delta H$) $\rightarrow$ enthalpy of products > enthalpy of reactants

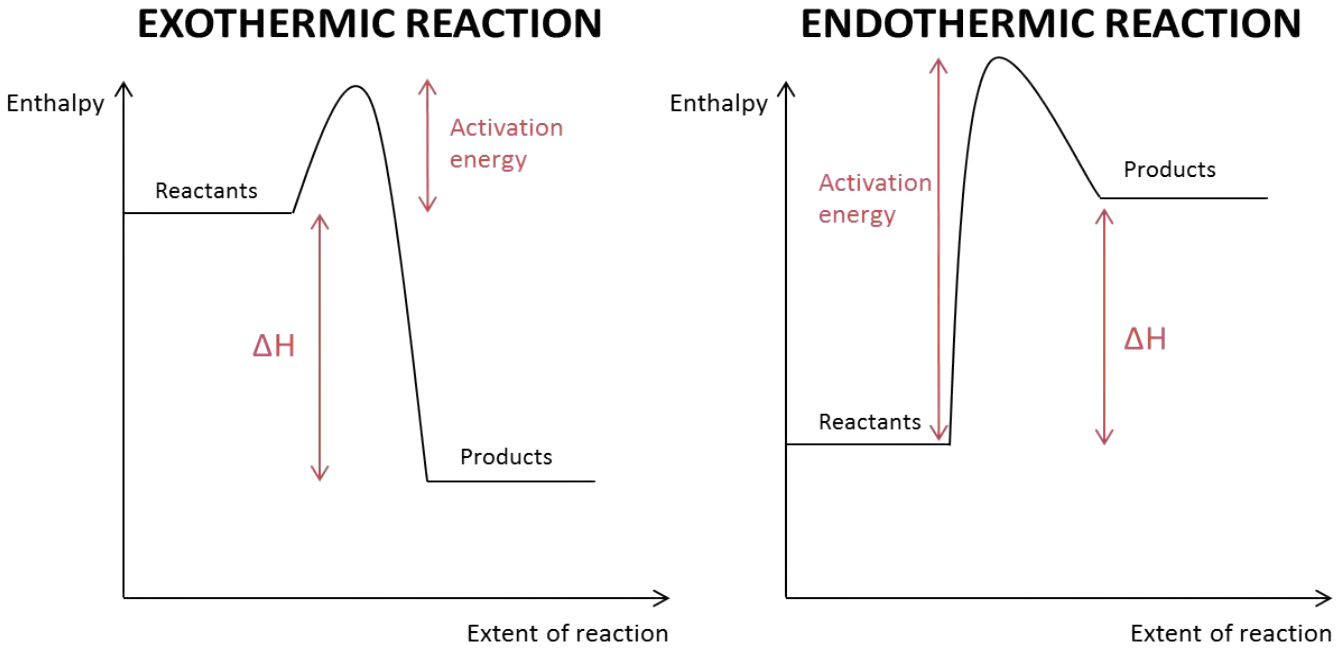
What is an exothermic reaction?

What is an exothermic reaction?

A reaction with an overall negative enthalpy change ($-\Delta H$) $\rightarrow$ enthalpy of products < enthalpy of reactants

Draw an enthalpy change diagram for an endothermic reaction, and one for an exothermic reaction

Draw an enthalpy change diagram for an endothermic reaction, and one for an exothermic reaction



What does activation energy mean?

What does activation energy mean?

The minimum energy required for a reaction to take place

Which way does the arrow for activation energy point on an enthalpy profile diagram?

Which way does the arrow for activation energy point on an enthalpy profile diagram?

Always points upwards

What are the standard conditions?

What are the standard conditions?

100 kPa

298 K

What does “in standard state” mean?

What does “in standard state” mean?

The state an element / compound exists at in standard conditions (100 kPa, 298 K)

Define enthalpy change of formation

Define enthalpy change of formation

The energy change that takes place when 1 mole of a compound is formed from its constituent elements in their standard state under standard conditions

Give an example of an equation which represents standard enthalpy of formation

Give an example of an equation which represents standard enthalpy of formation

There are many e.g. H_2 (g) + ½ O_2 (g) → H_2O (l)

Define enthalpy change of combustion

Define enthalpy change of combustion

The energy change that takes place when 1 mole of a substance is completely combusted

Give an example of an equation which represents standard enthalpy of combustion

Give an example of an equation which represents standard enthalpy of combustion

E.g. $C\ (s) + O_2\ (g) \rightarrow CO_2\ (g)$

Define enthalpy change of neutralisation

Define enthalpy change of neutralisation

The energy change that takes place when 1 mole of water is formed from a neutralisation reaction

What does enthalpy change of reaction mean?

What does enthalpy change of reaction mean?

The energy change associated with a given reaction

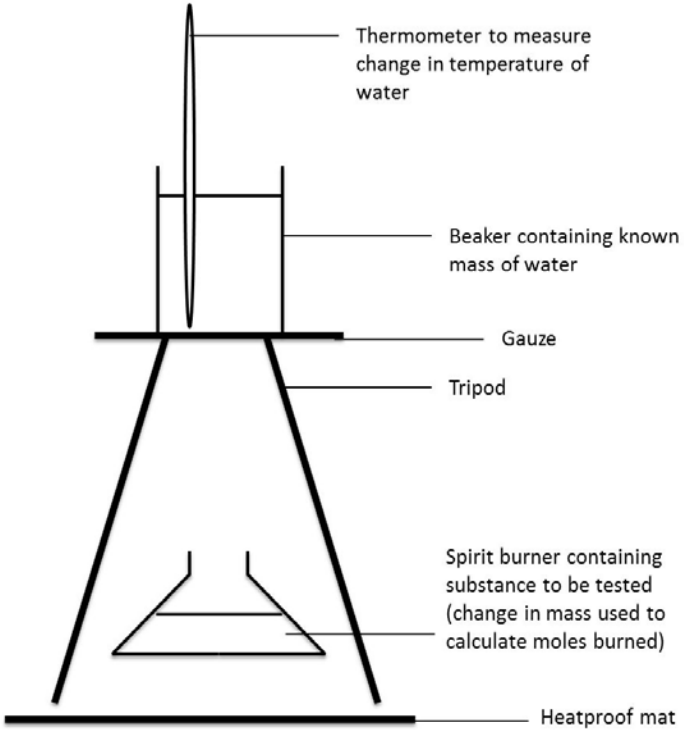
How can you calculate enthalpy change from experimental data?

How can you calculate enthalpy change from experimental data?

Use the equation $Q = mc\Delta T$, where m is the mass of the substance being heated (usually water), c is the specific heat capacity of that substance (water's SHC = 4.18gJ-1K-1) and ΔT is the change in temperature

Draw a simple calorimeter

Draw a simple calorimeter



What are the advantages of using a bomb calorimeter? (2)

What are the advantages of using a bomb calorimeter?

- Minimises heat loss
- Pure oxygen used → ensures complete combustion

Why might experimental methods for enthalpy determination not be accurate?

Why might experimental methods for enthalpy determination not be accurate?

Heat is lost to the surroundings

Not in standard conditions

Reaction may not go to completion

What does average bond enthalpy mean?

What does average bond enthalpy mean?

The mean energy required to break 1 mole of bonds in gaseous molecules

Why will using bond enthalpies not be as accurate as using standard enthalpy of combustion/formation?

Why will using bond enthalpies not be as accurate as using standard enthalpy of combustion/formation?

Bond enthalpies are a mean for the same bond across different molecules whereas standard enthalpy of combustion and formation apply just to that molecule, therefore they are more accurate.

How to calculate enthalpy change of reaction using average bond enthalpies?

How to calculate enthalpy change of reaction using average bond enthalpies?

$$\Delta H = \Sigma \text{ (bond enthalpies of reaction)} - \Sigma \text{ (bond enthalpies of products)}$$