

# WJEC (Wales) Chemistry

## A-level

### Topic 2.1 - Thermochemistry

#### Flashcards

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# What is enthalpy change?



# What is enthalpy change?

The heat energy change measured at constant pressure.



# What are standard conditions?



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Pressure - 100 kPa

Temperature - 298 K



# What is an exothermic reaction?



# What is an exothermic reaction?

A reaction in which energy is released to the surroundings.



# What is an endothermic reaction?





# What is an endothermic reaction?

A reaction in which energy is taken in from the surroundings.



What is the sign of  $\Delta H$  for exothermic and endothermic reactions?



What is the sign of  $\Delta H$  for exothermic and endothermic reactions?

Exothermic:  $\Delta H$  is negative

Endothermic:  $\Delta H$  is positive



What is the definition for the standard enthalpy change of reaction,  $\Delta_r H^\theta$ ?



What is the definition for the standard enthalpy change of reaction,  $\Delta_r H^\theta$ ?

The enthalpy change that occurs when the quantities of reactants shown in the equation react under standard conditions, with all reactants and products in their standard states.



What is the definition for the standard enthalpy change of formation,  $\Delta_f H^\theta$ ?



What is the definition for the standard enthalpy change of formation,  $\Delta_f H^\theta$ ?

The enthalpy change when one mole of product is formed from its constituent elements with all reactants and products in their standard states, under standard conditions.



What is the definition for the standard enthalpy change of combustion,  $\Delta_c H^\theta$ ?





What is the definition for the standard enthalpy change of combustion,  $\Delta_c H^\theta$ ?

The enthalpy change that occurs when one mole of compound is completely reacted with excess oxygen under standard conditions with all reactants and products in their standard states.



# What is Hess's law?



# What is Hess' law?

The enthalpy change of a reaction is independent of the route taken.



# What is mean bond enthalpy?



# What is mean bond enthalpy?

The energy needed to break a specific type of covalent bond, averaged out across a wide variety of different compounds.



Why do calculation results involving formation and combustion enthalpies differ to calculation results involving mean bond enthalpies?



Why do calculation results involving formation and combustion enthalpies differ to calculation results involving mean bond enthalpies?

The calculations using formation and combustion enthalpies are much more accurate. The mean bond enthalpies are averaged out over all the different types of compounds so they are not specific to the compound being investigated.



Which equation can be used to work out the energy transferred in a reaction?





Which equation can be used to work out the energy transferred in a reaction?

$$q = mc\Delta T$$

$q$  = energy released/absorbed (J)

$m$  = mass (g)

$c$  = specific heat capacity ( $\text{J g}^{-1} \text{ } ^\circ\text{C}^{-1}$ )

$\Delta T$  = temperature change ( $^\circ\text{C}$ )



Why are energy change reactions carried out in an insulated container?



Why are energy change reactions carried out in an insulated container?

To prevent heat energy loss to the surroundings.



Describe an experiment that can be conducted to investigate the enthalpy change for the thermal decomposition of potassium hydrogencarbonate



# Describe an experiment that can be conducted to investigate the enthalpy change for the thermal decomposition of potassium hydrogencarbonate

1. Weigh 3 g of potassium carbonate into a test tube.
2. Use a burette to add 30 cm<sup>3</sup> of 2 mol dm<sup>-3</sup> hydrochloric acid to a polystyrene cup in a beaker.
3. Measure the initial temperature of the acid.
4. Add the potassium carbonate to the cup. Continually measure the temperature and stir. Record the highest temperature reached.
5. Use the equation  $q=mc\Delta T$  to calculate the enthalpy change.

