

## C5 Energy changes AQA Trilogy

Chemical reactions only occur if...

Activation energy is



The overall energy change of a reaction  
=  
The sum of the energy needed to break the bonds in the reactants  
-  
The sum of the energy needed to make the bonds in the products

### Exothermic reactions

What is an exothermic reaction

Give examples of exothermic reactions

Give useful applications of exothermic reactions

Delete as appropriate:

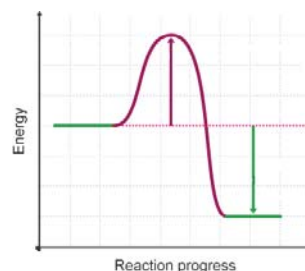
Energy is released when bonds are made / broken.

This is exothermic / endothermic

Energy needs to be supplied when bonds are made / broken

This is exothermic / endothermic

Energy level diagram label on: reactants, products, activation energy & energy change



Hydrogen and chlorine react to form hydrogen chloride gas:  $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$   
Calculate energy change.

Bond	Bond Energy (kJ/mole)
H-H	436
Cl-Cl	243
H-Cl	432



### Endothermic reactions

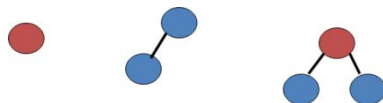
What is an endothermic reaction

Give examples of endothermic reactions

Give useful applications of endothermic reactions

In an exothermic reaction, the energy \_\_\_\_\_ from forming new bonds is greater than the energy needed to break existing bonds

In an endothermic reaction, the energy needed to \_\_\_\_\_ existing bonds is greater than the energy released from forming new bonds



Sketch an energy level diagram to show an exothermic reaction with labels

Hydrogen bromide decomposes to form hydrogen and bromine:  $2\text{HBr} \rightarrow \text{H}_2 + \text{Br}_2$   
Calculate energy change

Bond	Bond Energy (kJ/mole)
H-Br	366
H-H	436
Br-Br	193



### RPA 10: Temperature changes

Describe how to tell if a reaction is exothermic or endothermic



Claire puts  $25\text{cm}^3$  of ethanoic acid into a polystyrene cup with  $25\text{cm}^3$  of potassium hydroxide. Both liquids started at  $21^\circ\text{C}$ . After 2 minutes the temperature of the reaction mixture is  $28.5^\circ\text{C}$ . Is the reaction endothermic or exothermic?

What measurements need to be taken?

Why might the reaction mixture be placed in a polystyrene cup rather than a glass beaker?



Sketch an energy level diagram to show an endothermic reaction with labels

State if the diagrams show endo or exothermic reactions

