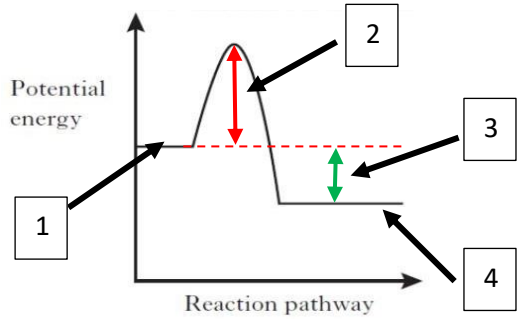
Science: Energy Changes

1. Key Words

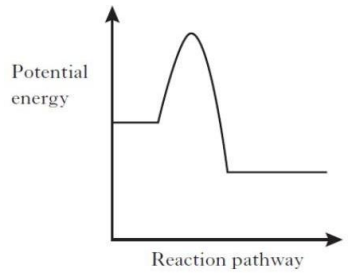
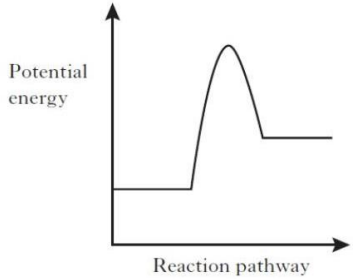
Key Word	Definition
Exothermic	Reaction that has an overall increase in thermal energy
Endothermic	Reaction that has an overall decrease in thermal energy
Activation energy	Amount of energy needed for a reaction to occur
Decomposition	Use of thermal energy to break down a compound e.g. calcium carbonate → calcium oxide + carbon dioxide

2. Energy Profiles

1	Reactants
2	Activation energy
3	Overall energy change
4	products



3. Exothermic and Endothermic Reactions

Exothermic reaction	Endothermic reactions
	
Energy of the products is lower than the energy of the reactants, so thermal energy is released to the surroundings	Energy of the products is higher than the energy of the reactants, so thermal energy is taken in from the surroundings

4. Calculating Bond Energies (HT only)

Energy must be supplied to break the bonds in the reactants
Energy is released when bonds in the products are made

Example:

Bond	H – H	Br – Br	H – Br	I – I	Cl – Cl
Bond energy (kJ)	436	193	366	150	242

H – H + Br – Br → 2H – Br

Reactants
H – H = 436
Br – Br = 193
Total energy = 436 + 193 = **629**

Products
H – Br = 366 x 2 = 732
Total energy = **732**

Overall energy change = 692 – 732 = **-103 kJ**

The reaction is exothermic