

# Lesson 7- Exothermic and Endothermic reactions

Chemistry- Key Stage 3

Energetics

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## During endothermic reactions...

A

The temperature of the surroundings increases

C

The particles decrease in temperature

B

The temperature of the surroundings decreases

D

The particle temperature increases



## During endothermic reactions...

A

Bonds are broken

C

New bonds are made

B

Nothing happens to the  
bonds

D

Bonds are broken and  
made



## During exothermic reactions...

A

Chemical energy is given out to the surroundings

C

Thermal energy is given out to the surroundings

B

Thermal energy is taken in from the surroundings

D

Light energy is given out to the surroundings



# Describe an exothermic reaction

Use the previous example and keywords:

Thermal, increases, energy, made, surroundings, bonds



Reaction	Start temperature (°C)	End temperature (°C)	Temperature change (°C)	Exothermic or Endothermic?
Iron filings + copper sulphate	21	25		
Sodium hydroxide + hydrochloric acid	25	31		
Water + ammonium nitrate	20	9		



# Water and Ammonium nitrate

20cm<sup>3</sup> of water is added to a styrofoam cup, then the temperature is taken. A spatula of ammonium nitrate is added. The mixture is stirred and the temperature is taken every 20 seconds.



## How could I make this equipment better?

Source of error during practical work	Suggestion for improvement	How this would improve results
<b>Energy transfer through the beaker</b>	Use a polystyrene cup or insulate the beaker	Reduce energy transfers through the beaker and therefore improve the accuracy of the temperature change
<b>Energy transfer at the surface of the liquids</b>	Use a lid	
<b>Misreading the thermometer</b>		





# Answers



## During endothermic reactions...

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The temperature of the surroundings increases

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# Describe an exothermic reaction

Use the previous example and keywords:

Thermal, increases, energy, made, surroundings, bonds

When thermal energy is given out to the surroundings, the reaction is exothermic. During the reaction, bonds are broken and can be made. When this happens the temperature increases.



Reaction	Start temperature (°C)	End temperature (°C)	Temperature change (°C)	Exothermic or Endothermic?
Iron filings + copper sulphate	21	25	$25 - 21 = 4$	<b>Exothermic</b>
Sodium hydroxide + hydrochloric acid	25	31	$31 - 25 = 6$	<b>Exothermic</b>
Water + ammonium nitrate	20	9	$9 - 20 = -11$	<b>Endothermic</b>



# Water and Ammonium nitrate

IV: Time (s)

DV: Temperature change ( $^{\circ}\text{C}$ )

CV: Material of container and cover, number of stirs, volume of water, mass of ammonium nitrate.



## How could I make this equipment better?

Source of error during practical work	Suggestion for improvement	How this would improve results
Energy transfer through the beaker	Use a polystyrene cup or insulate the beaker	Reduce energy transfers through the beaker and therefore improve the accuracy of the temperature change
Energy transfer at the surface of the liquids	Use a lid	<u>Reduce energy transfers</u> and <u>improve the accuracy</u> of the temperature change
Misreading the thermometer	Use a digital temperature probe	<u>Easier to read</u> – less chance of a mistake

