

Lesson 9- Complete and incomplete combustion

Chemistry- Key Stage 3

Energetics

Miss Charlton



Which gas is produced during incomplete combustion?

A

Carbon minoxide

B

Carbon dioxide

C

Helium

D

Carbon monoxide



Which flame does a closed collar on a Bunsen burner produce?

A

Red flame

B

Roaring blue flame

C

Safety flame

D

Pink flame



Which flame produces more energy?

A

Red flame

B

Roaring blue flame

C

Safety flame

D

Pink flame



What has to be open for complete combustion to occur when using a Bunsen burner?

A

The collar

B

A window

C

The gas valve

D

The door to the room



Identify the comparative or contrasting language

- There are more reactants in the disposable handwarmer, making their manufacture more complicated.
- The disposable handwarmer reaches a 20°C higher maximum temperature than the reusable one and is 3x warmer 5 hours later so it stays warmer for longer.
- The maximum temperature of 70°C might be too high and could cause skin burns, so the reusable one may be safer.
- The disposable one is 8x cheaper than the reusable one, but cannot be used again, whereas, after 8 uses, the reusable one would be better value.



Compare the two types of combustion reactions (6 marks)

	Complete combustion	Incomplete combustion
Oxygen supply	Good	Poor
Products	Carbon dioxide and water	Carbon monoxide, carbon and water
Colour of flame	Blue	Orange
Soot produced	No	Yes
Energy released	High (1,500°C)	Low (500°C)



Complete the task

Pollutant

**When/how is it
produced?**

**Problems it
causes**

Carbon dioxide

During complete
combustion

Increases global
warming

Carbon monoxide

Soot/carbon

Nitrogen dioxide

Sulphur dioxide



Answers



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Compare the two types of handwarmers (6 marks)

- There are more reactants in the disposable handwarmer, making their manufacture more complicated.
 - The disposable handwarmer reaches a 20°C higher maximum temperature than the reusable one and is 3x warmer 5 hours later so it stays warmer for longer.
 - The ~~maximum temperature~~ of 70°C might be too high and could cause skin burns, so the reusable one may be safer.
 - The disposable one is 8x cheaper than the ~~reusable~~ one, but cannot be used again, whereas, after 8 uses, the reusable one would be better value.
-



Compare the two types of combustion (6 marks)

- **Both** complete and incomplete combustion are burning reactions.
- **Similarly** they both require oxygen and so are oxidation reactions and both release heat, so are exothermic.
- **However**, complete combustion uses **more** oxygen and releases **3x more** heat **than** incomplete combustion does, because more of the carbon and hydrogen is oxidised.
- The flame is blue, **whereas** incomplete combustion has a yellow flame.
- The waste products are different – incomplete combustion produces toxic carbon monoxide and carbon **whilst** complete combustion produces carbon dioxide and water



Environmental effects of pollutants

Pollutant	When/how is it produced?	Problems it causes
Carbon dioxide	Complete combustion	Increases global warming
Carbon monoxide	Incomplete combustion	Binds to red bloods cells making them unable to carry oxygen, so it is poisonous.
Soot/carbon	Incomplete combustion	Global dimming and lung disease
Nitrogen dioxide	Sulphur in fossil fuels reacting with oxygen in the air	Dissolves in clouds to form acid rain
Sulphur dioxide	Nitrogen in the air reacting with oxygen in hot engines	Dissolves in clouds to form acid rain

