

# MARK SCHEME

# GCSE

## CHEMISTRY

## AQA - TRIPLE SCIENCE

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C5 - TEST 2

ENERGY CHANGES

Beginner

## Mark schemes

- 1.** (a) hydrogen + oxygen → water  
*accept  $2H_2 + O_2 \rightarrow 2H_2O$  or balanced multiples or fractions*  
*allow 1 or 2 correct formulae substituted for words*  
*allow hydrogen oxide **or** steam for water* 1
- (b) supplied  
released  
*both needed, must be in this order* 1
- (c) (i) B 1
- (ii) A 1
- (iii) to overcome activation energy to react **or** (activation) energy needed to start reaction  
*allow to provide energy* 1
- [5]**
- 2.** (a) nitrogen / N<sub>2</sub>  
*[Do not allow N or N<sup>2</sup>] for 1 mark*
- (b) heat  
*for 1 mark*
- (c) carbon dioxide / CO<sub>2</sub>  
*for 1 mark*
- [3]**
- 3.** (a) 22 1
- (b) (i) exothermic 1
- (ii) C 1
- gives out most heat energy*  
*accept has largest temperature change / increase*  
*allow has highest (final) temperature **or** hottest* 1
- (c) (i) increases 1

- (ii) blue  
*ignore pale / dark etc* 1
- (iii) reversible (reaction)  
*allow goes both ways **or** two / either way* 1
- (iv) anhydrous copper sulfate 1

[8]

- 4.** (a) heat / energy 1
- given out / transfers to surroundings  
*the mark for given out / transfers to cannot be awarded without heat / energy*  
*allow given off* 1

- (b) (i) decreases 1
- increases 1
- (ii) it gives the particles more energy 1
- it makes the particles move faster 1

[6]

- 5.** (a) (i) 4 1
- (ii) (Make) 3 1
- biggest temperature rise 1
- (b) (i) 1008 (kJ)  
*correct answer with or without working gains 2 marks*  
*if incorrect answer given allow evidence of  $240 \times 4.2$  for 1 mark* 2

(ii) crisps have a high energy content  
*allow crisps have lots of calories / kilojoules / fat / one ninth of daily energy intake*

1

so if you take in more energy than you need the excess is stored as fat  
*accept consequences: obesity; heart disease; high blood pressure; diabetes; arthritis*

**or**

crisps contain salt (1)

too much salt can cause high blood pressure **or** heart problems or kidney problems (1)

1

[7]

6.

(a) electricity / (high) temperatures  
*allow lightning / heat*  
*ignore energy*

1

(b) nitrogen + oxygen → nitrogen oxide/ monoxide  
*allow any oxide of nitrogen*

1

(c) more than

1

(d) (i) A

1

(ii) C

1

[5]

7.

(a) (i) oxygen (not air)  
(ii) oxides/monoxides/dioxides  
*for 1 mark each*

Do not allow specific examples

2

(b) (i) water

(ii) sulphur

(iii) carbon

*for 1 mark each*

3

(c) gives out/releases heat/energy  
*for 1 mark* 1

(d) (i) carbon dioxide  
(ii) carbon  
*for 1 mark each*  
  
(allow correct symbols/formulae) 2

[8]

8.

(a) (i) increase 1  
(ii) energy is given out to the surroundings 1

(b) (i) NO 1  
*allow 2NO*  
*ignore nitrogen oxide*  
*do **not** allow equations*

(ii) harmful / poisonous (owtte) 1  
*allow dangerous*  
*ignore reference to pollution / global warming*  
*do **not** accept references to ozone layer*

(c) a catalyst can speed up a chemical reaction 1  
  
different reactions need different catalysts 1

(d) (i) smaller 1  
*accept less / tiny / very small*  
*allow  $10^{-9}$*   
*do **not** allow small unless qualified*

(ii) reduce cost (owtte) **or** 1  
*ignore references to energy*  
  
save resources / raw materials (owtte)

[8]

- 9.** (a) sodium  
hydrogen  
phosphorus  
oxygen
- 2 marks for all 4  
1 mark for 2 or 3  
0 marks for 0 or 1  
not symbols / formulae*
- 2
- (b) (i) gives out
- gets hot(ter) / temperature rises (1)*
- 1
- heat / energy
- independent mark*
- 1
- (ii) **Quality of written communication**  
*for clearly expressed ideas*
- 1
- take temperature of water at start
- owtte*
- 1
- take temperature after adding soup powder
- 1
- plus any **one** from:
- using a thermometer
  - mix / stir / shake etc
  - in beaker / conical flask / test tube / plastic cup
  - temperature will rise (indicates an exothermic reaction)
- 1

**[8]**

- 10.** (a) Bunsen (burner)
- accept spirit burner do not credit candle*
- 1
- (b) blue
- 1
- white
- credit (1) if both colours correct but answers are reversed*
- 1

to cool the tube (B)

*accept answers which anticipate part (d) e.g. 'to condense the water vapour' or gases or vapours*

1

(d) (i) water

*do not credit 'condensation'*

1

(ii) (Water) vapour from the crystals (from tube A)

*accept steam or steam from tube A*

1

condenses or cools

*accept turns to (liquid) water*

1

(e) add water

gets hot or hotter or warm or warmer turns into solution  
dissolves

*or the temperature rises or there is an exothermic reaction  
accept steams or hisses ignore any reference to colour(s)*

2

(f) sulphuric acid

*accept H<sub>2</sub>SO<sub>4</sub> only if correct in every detail*

1

[10]

11.

(a) measuring cylinder

1

(b) use a polystyrene cup

*allow insulate the beaker and / or use a lid*

1

better insulator

or

reduces energy transfer from the surroundings

1

(c) starting temperature of hydrochloric acid

1

volume of hydrochloric acid

1

(d) 21.4 (°C)

1

- (e) 15.8 (°C) to 16.1 (°C)  
*allow 16.1 (°C) to 15.8 (°C)*

1

(f) 
$$\frac{16.1 + 15.8 + 15.9}{3}$$

=15.9 (°C)

*an answer of 15.9(333..) (°C) scores 2 marks*

1

*allow 15.9(333..) (°C)*

1

- (g) temperature decreases

1

- (h) straight line from (1.0, 19.8) to (5.0, 14.6)  
*ignore continuation of line in either direction*

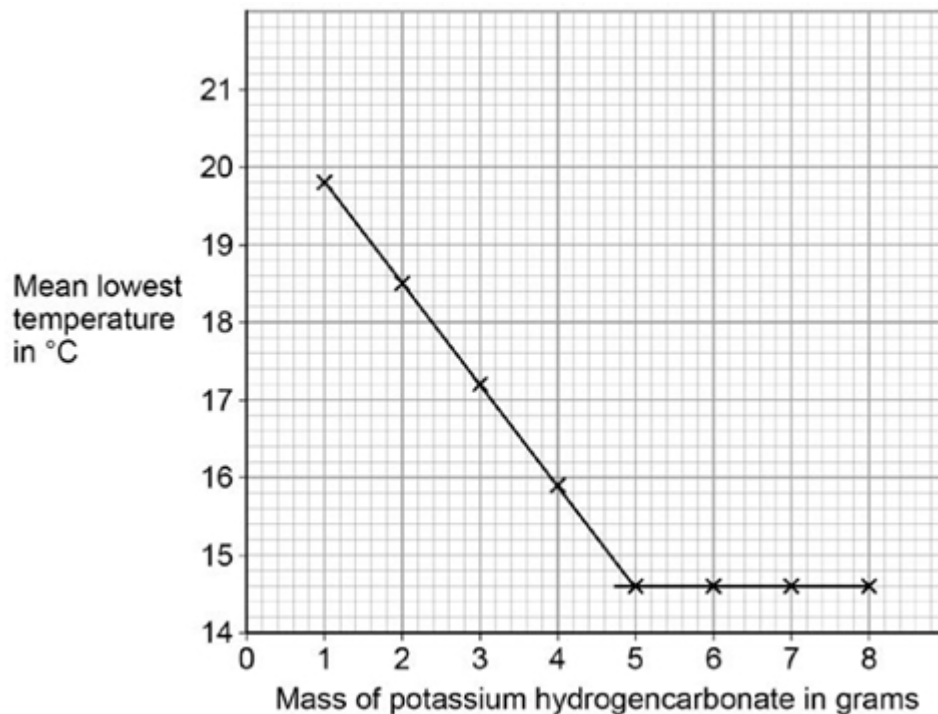
1

horizontal straight line from (5.0, 14.6 to 8.0, 14.6)

*ignore continuation of line in either direction*

1

the answer below scores 2 marks





(i) (lowest) temperature decreases

1

to 14.6 °C

**or**

until 5 g added

1

then no change to temperature (after 5 g solid added)

**or**

then temperature remains at 14.6 °C (after 5 g solid added)

1

[15]