AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.6.2.2

Energy changes and reversible reactions

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**6**
Available paper years	**2010–2025**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.6.2.2 Energy changes and reversible reactions

Answer 01 · Mark scheme

June 2010 | CHY2F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)	white to blue	accept colourless to blue	1
1(b)	reversible		1
Total			**2**

4.6.2.2 Energy changes and reversible reactions

Answer 01 · Mark scheme

June 2010 | CHY2F | Original Q1 | Legacy

CHY2F

4.6.2.2 Energy changes and reversible reactions

Answer 02 · Mark scheme

June 2011 | CHY2F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)(i)	NH_3		1
1(a)(ii)	electrons		1
1(a)(iii)	covalent		1
1(b)(i)	air natural gas		1 1
1(b)(ii)	reversible		1
1(b)(iii)	iron		1
1(c)	nitric acid		1
1(d)(i)	any **one** from: • lost jobs / unemployment • meant that they had to move away from Humberstone **or** no one lives there • loss of income (owtte)	 allow closed down the town ignore it closed the mine unless it is further qualified by some effect of this on the local community	1

Question 1 continues on the next page

Question 1 continued

question	answers	extra information	mark
1(d)(ii)	any **two** from: • less transport (costs) • less pollution / greenhouse gases / global warming <u>from transport</u> • cheaper to make in country than to import • not dependent on Chile for nitrate supplies **or** reliable source • provides employment to workers in Britain • good for British economy • raw materials readily available • continuous process	ignore reference to environment / ecofriendly allow smaller carbon footprint ignore reference to quicker	2
Total			**11**

4.6.2.2 Energy changes and reversible reactions

Answer 02 · Mark scheme

June 2011 | CHY2F | Original Q1 | Legacy

CHY2F

4.6.2.2 Energy changes and reversible reactions

Answer 03 · Mark scheme

June 2016 | CH2FP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / SpecRef
6(a)	endothermic		1	AO1 2.5.1d
6(b)	82 (%)	correct answer with working gains **3** marks if 17 or 34 not shown in working **max 2** marks accept 82.4 accept 82.35 to full calculator display (82.35294...) correctly rounded to at least 2 sf if no answer or incorrect answer, then (M_r =) 17 gains **1** mark **or** 14/17 gains **2** marks **OR** ($2M_r$ =) 34 gains **1** mark **or** 28/34 gains **2** marks **OR** 14/their M_r shown gains **1** mark **or** correct calculation of 14/their M_r gains **2** marks	3	AO2 2.3.3a, 2.3.1f
6(c)(i)	7 / seven		1	AO1 2.6.2d
6(c)(ii)	$H^+ + OH^- \rightarrow H_2O$		1	AO1 2.6.2e
6(c)(iii)	ammonium chloride	allow NH_4Cl ignore an incorrect formula	1	AO1 2.6.2b

Question 6 continues on the next page

Question 6 continued

Question	Answers	Extra information	Mark	AO / SpecRef
6(d)			6	2AO2 / 4AO3 2.6.2c

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content.	Suggestion with a reference to a graph.	Suggestion with reasons referring to more than one graph.	Suggestion with reasons from all three graphs, and linking of ideas which may explain a compromise.

Examples of chemistry points made in response:

A reasonable suggested amount of fertiliser would be in the region of 200 kg (per ha). Accept any suggestion from about 180 kg (per ha) to 500 kg (per ha).

Yield:

- Using fertiliser improves yield.
- Yield improved most up to about 200 kg (per ha) of fertiliser.
- Yield only increased slightly above about 200 kg (per ha).

Profit:

- About 200 kg of fertiliser gives the most profit.
- Above about 200 kg (per ha) of fertiliser profit declines.

Run off:

- Run off is at low levels until about 300 kg (per ha) of fertiliser.
- Above about 300 kg (per ha) of fertiliser, run off increases.

Examples of linking of ideas:

- Overall 200 kg gives high crop yield and most profit.
- In conclusion 200 kg gives high crop yield and low run off.
- 200 kg gives most profit and low run off.

Examples of compromise:

- Profits go down after about 200 kg (per ha) of fertiliser because cost of fertiliser is not covered by increased yield.
- 200 kg gives the highest profit although it is not the highest yield.
- 500 kg gives the best yield but has the most runoff.

Total			13

4.6.2.2 Energy changes and reversible reactions

Answer 04 · Mark scheme

June 2019 | 8462/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	(equation contains a) ⇌ (symbol)	allow description of arrow / symbol	1	AO1 4.6.2.1
03.2	exothermic		1	AO1 4.6.2.2
03.3	to reduce costs to use less energy		1 1	AO3 4.6.1.4
03.4	(the world production of ammonia) increased (the increase was) not steady / linear	 do **not** accept decreases ignore levels off	1 1	AO2 4.10.4.1
03.5	the demand for food changed the world population changed		1 1	AO2 AO3 4.10.4.2
03.6	**C** and **D**		1	AO3 4.10.4.2
03.7	**D**		1	AO3 4.10.4.2
Total			**10**	

Answer 05 · Mark scheme

November 2021 | 8462/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	(equation contains the symbol) ⇌	allow description of arrow / symbol	1	AO1 4.6.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	the mass of each substance does not change the rates of the forward reaction and reverse reaction are equal		1 1	AO3 AO1 4.6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	the mixture will have become a paler purple		1	AO3 4.6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	increases decreases increases	must be in this order	1 1 1	AO1 4.6.1.2 4.6.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	change the temperature **or** add a catalyst	ignore references to pressure	1	AO1 4.6.1.2 4.6.1.3

Total			8

4.6.2.2 Energy changes and reversible reactions

Answer 06 · Mark scheme

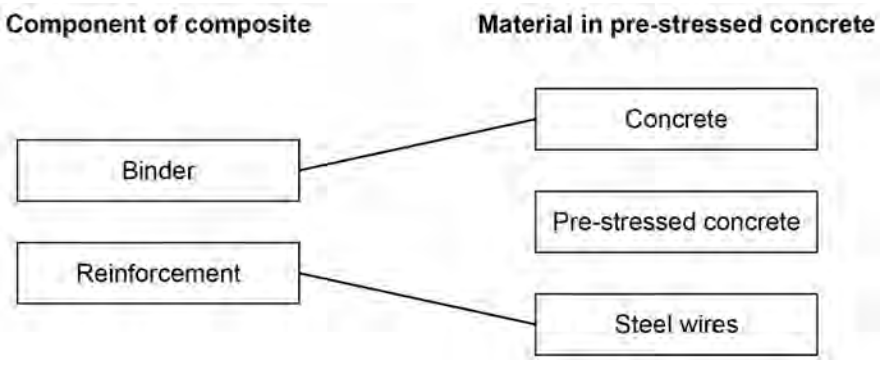
June 2025 | 8462/2F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	(the sign) ⇌	allow a description of the reversible sign	1	AO1 4.6.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	endothermic	allow (thermal) decomposition	1	AO1 4.6.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	(energy released =) $\frac{4}{20} \times 23$ = 4.6 (kJ)		1 1	AO2 4.6.2.2

Question	Answers	Mark	AO / Spec. Ref.
03.4	 do **not** accept more than one line from a box on the left	1 1	AO2 4.10.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	iron	allow Fe	1	AO1 4.10.3.2

4.6.2.2 Energy changes and reversible reactions

Answer 06 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	clay		1	AO1 4.10.3.3

Total Question 3	8

4.6.2.2 Energy changes and reversible reactions

Answer 06 · Examiner comments June 2025 | 8462/2F | Original Q3

03.1 The reversible symbol was identified or correctly described by three quarters of students. Those that did not gain the mark talked about the 'equals sign' or the 'reversible sign' without a description.

03.2 Nearly 9 in 10 students correctly identified the type of reaction as 'endothermic'.

03.3 Well in excess of half of students correctly calculated the energy change. The methods employed were varied, with none being more common.

03.4 Around half of students correctly identified both materials. Many students completely reversed the responses. If 1 mark was awarded it was most likely for correctly identifying the reinforcement.

03.5 Over half of all students

Question 3

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03.5 Over half of all students were able to identify iron. Aluminium and copper were the most frequently seen incorrect answers.

Answer 06 · Examiner comments June 2025 | 8462/2F | Original Q3

03.6 Three quarters of students correctly identified clay. Poly(ethene) was the most common incorrect response.