AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.8.1.1

Pure substances

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**2**
Available paper years	**2021–2023**

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.

5.8.1.1 Pure substances

Answer 01 · Mark scheme

November 2021 | 8464/C/2H | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	add water to anhydrous copper sulfate	allow a description of heating hydrated copper sulfate to produce anhydrous copper sulfate, followed by addition of water	1	AO2
	colour changes from white		1	AO1
	to blue		1	AO1 5.6.2.1
03.2	a single element or compound	allow an element or compound not (mixed) with any other substance ignore only one type of substance	1	AO1 5.8.1.1
03.3	(% impurity = $\frac{0.6}{0.12}$) = 5		1	AO2 5.8.1.1
	(mass impurity =) $\frac{5}{100}$ × 250		1	
	= 12.5 (g)		1	
03.4	heat salty water	allow boil salty water	1	AO1 5.10.1.2 RPA13
	(so) water evaporates (as water vapour)		1	
	cool the (water) vapour		1	
	(which) condenses to form potable / liquid water		1	

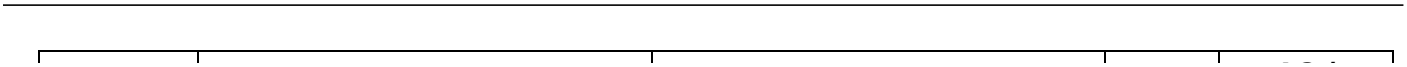
5.8.1.1 Pure substances

03.5	distillation requires energy (to boil salty water) (but) ground water only needs filtering **and** sterilising	allow distillation requires fuel (to boil salty water)	1 1	AO1 5.10.1.3 RPA13
Total			**13**	

5.8.1.1 Pure substances

Answer 01 · Mark scheme

November 2021 | 8464/C/2H | Original Q3



5.8.1.1 Pure substances

Answer 02 · Mark scheme

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	$CH_4 + \mathbf{2}\,O_2 \rightarrow CO_2 + \mathbf{2}\,H_2O$		1	AO2 5.7.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	hydrocarbon molecules in petrol have fewer carbon atoms than those in diesel petrol has a lower boiling point (range) than diesel	allow converse throughout allow petrol is more flammable than diesel allow petrol is less viscous than diesel	1 1	AO3 5.7.1.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	oxygen		1	AO1 5.8.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	air	allow the atmosphere allow from volcanoes	1	AO1 5.9.1.1 5.9.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	global dimming		1	AO2 5.9.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	(carbon monoxide is) colourless **or** (carbon monoxide is) odourless	ignore clear	1	AO1 5.9.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	(diesel) burns at a high temperature **or** (diesel) burns at a temperature greater than 100 °C		1	AO2
	(which is) above the boiling point of water		1	AO3 5.2.2.1 5.9.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.8	sulfur dioxide (is produced when diesel is burnt)		1	AO1 5.9.3.1 5.9.3.2
	(which causes) acid rain		1	
	(which results in) any **one** from: • damage to buildings / statues / bridges • damage to trees / plants • damage to aquatic life • acidification of lakes / rivers / soil • respiratory problems	allow (which affects) asthma	1	

Total Question 1	12

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Answer 01 · Examiner comments November 2021 | 8464/C/2H | Original Q3

Question 3 (standard, standard / high and high demand)

It is insufficient to simply state that a pure substance is only made up of one type of substance. Answers need to indicate that it is a single element or compound.

The principles of distillation were well known. Many students successfully described how water could be separated from the solution but often did not go on to explain how the water vapour was changed into a liquid. Cooling of the water vapour to bring about condensation was rarely seen. Many students did not link question 03.4 with question 03.5 to explain why obtaining potable water from salty water is more expensive than from ground water. No credit was given the latter being an easier process or taking less time. Some students were able to recognise that costs were linked to energy consumption. Ground water needed to be both filtered and sterilised to gain the second marking point in question 03.5

Answer 02 · Examiner comments June 2023 | 8464/C/2H | Original Q1

Question 1

01.1 Four in five students successfully balanced the equation.

01.2 Just over two in five students gained both marks for comparing petrol and diesel. A further third gained one mark. On this occasion, students needed to interpret what the table headings meant, so many weren't able to gain credit as they referred to the range of numbers of carbons, rather than the number of carbons and similarly, though more infrequent, for the boiling points.

01.3 Nearly nine in ten students identified oxygen as the common element in the compounds released from a car engine.

01.4 Just over a third of students were able to identify that nitrogen came from the air. Much more common suggestions were from the engine or the diesel fuel.

01.5 This question tested a little known part of the specification, with fewer than a quarter identifying global dimming as a consequence of particulates in the atmosphere. By far the most common incorrect response was for global warming.

01.6 Just below three quarters of students answered that carbon monoxide is either colourless or odourless. Many students gave both, despite being asked for one.

5.8.1.1 Pure substances

Answer 02 · Examiner comments June 2023 | 8464/C/2H | Original Q1

01.7 Around one in ten gained two marks on this question, with a further quarter gaining one. The question was applying ideas from across the specification. Just a statement that water evaporates was insufficient for credit, as there needed to be a realisation that water is produced as a vapour, rather than turning into a vapour during the process.

01.8 Around half of students gained at least one mark on this question, usually for recognising that sulfur is responsible for acid rain. The consequences of acid rain were known by about a quarter, however, around than one in ten knew that sulfur enters the atmosphere as sulfur dioxide and so gained all marks. Again, global warming was the most common incorrect response here.