

MARK SCHEME

GCSE

CHEMISTRY

AQA - COMBINED SCIENCE

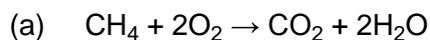
C9 - TEST 3

CHEMISTRY OF THE ATMOSPHERE

Intermediate

Mark schemes

1.



1

(b) toxic

accept causes death

1

acid rain

or

respiratory problems

accept respiratory problems / asthma

1

global dimming

1

(c)

Level 3: A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5-6
Level 2: Some logically linked reasons are given. There may also be a simple judgement.	3-4
Level 1: Relevant points are made. They are not logically linked.	1-2
No relevant content	0
Indicative content <ul style="list-style-type: none"> methane is the best fuel because it gives more energy per gram than coal, and gives less carbon dioxide per kJ of energy produced petrol is best because it being a liquid is easier to handle than gas or coal - although the energy content is lower than the others, it gives out less carbon dioxide than coal methane has more energy per gram than coal coal produces most carbon dioxide coal can produce sulfur dioxide 	

6

[10]

2.

(a) any **two** from:

- the area of ocean with sea ice has reduced since 1979
- the amount of ice follows the same pattern during a year
allow ice reduces in the summer and increases in the winter
- most ocean with sea ice in February / March
- least ocean with sea ice in September / October
- area of ocean with sea ice decreases from March to September each year
- area of ocean with sea ice increases from September to February / March each year
- decrease is greater between 1995 and 2016 compared with 1979 to 1995
allow other correct conclusions derived from the graph

2

(b)

Level 3: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5-6
Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.	3-4
Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1-2
No relevant content	0
Indicative content <ul style="list-style-type: none"> • deforestation has reduced the number of trees on the planet • which has reduced the amount of carbon dioxide that can be removed from the atmosphere • increased combustion releases more carbon dioxide into the atmosphere • therefore there is a build-up of carbon dioxide in the atmosphere • (build up) allows short-wavelength radiation to pass into the Earth's atmosphere • and absorbs long-wavelength • causing an increase in global temperature • the increase in temperature causes ice to melt 	

6

[8]

3.

- (a) any **one** from:
- not enough evidence or proof
allow no evidence or no proof
 - (life and the Earth were created) billions of years ago
allow a long time ago
ignore different beliefs or no one was there.

1

- (b) 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 in the Marking Guidance and apply a 'best-fit' approach to the marking.

0 marks

No relevant content

Level 1 (1–2 marks)

Statements based on diagrams

Level 2 (3–4 marks)

Description of how one change occurred

Level 3 (5–6 marks)

Descriptions of how at least two changes occurred

Examples of chemistry points made in the response could include:

Main changes

- oxygen increased because plants / algae developed and used carbon dioxide for photosynthesis / growth producing oxygen; carbon dioxide decreased because of this
- carbon dioxide decreased because oceans formed and dissolved / absorbed carbon dioxide; carbon dioxide became locked up in sedimentary / carbonate rocks and / or fossil fuels
- oceans formed because the Earth / water vapour cooled and water vapour in the atmosphere condensed
- continents formed because the Earth cooled forming a supercontinent / Pangaea which formed the separate continents
- volcanoes reduced because the Earth cooled forming a crust.

Other changes

- nitrogen has formed because ammonia in the Earth's early atmosphere reacted with oxygen / denitrifying bacteria.

6

[7]

4.

- (a) carbon dioxide decreased (by plants / trees)
allow plants / trees absorbed carbon dioxide

1

oxygen increased (by plants / trees)

allow plants / trees released oxygen

if neither of these marks awarded

allow plants / trees

photosynthesise for 1 mark

1

because coal 'locks up' / traps / stores carbon dioxide / carbon

allow trees 'locked up' carbon dioxide / carbon

1

(b) carbon / C

hydrogen / H

sulfur / S

all 3 correct 2 marks

1 or 2 correct 1 mark

allow H₂

ignore oxygen

2

(c) (i) 2 2

balancing must be correct

*do **not** accept changed formulae*

1

(ii) increases atmospheric pollution

carbon dioxide / CO₂ released

1

from the (thermal) decomposition of calcium carbonate **or**

*accept causes global warming **or** CO₂ is a greenhouse gas*

description of this decomposition **or** equation

ignore sulfur dioxide and effects in this part

1

decreases atmospheric pollution

sulfur dioxide / SO₂ is removed

accept less acid rain produced

1

by reaction with calcium oxide **or** calcium carbonate

*accept neutralisation **or** forms calcium sulfate*

1

[10]

5.

(a) (thought to cause) global warming / green house (effect) / climate change

ignore other consequences of global warming

*do **not** accept acid rain / ozone layer / global dimming*

1

(b) any **three** from:

- replant trees / renewable / sustainable

ignore reusable

- carbon (dioxide) used by trees / photosynthesis

accept trees absorb carbon (dioxide) as they grow

ignore respiration

- it is a (continuous / carbon) cycle

accept burning wood is carbon neutral

or

carbon (dioxide) goes back into the air

*for the **second** and **third** bullet points: accept trees use carbon dioxide which is released when (trees / wood are / is) burnt for **2** marks*

- no new carbon (dioxide) is produced

or

no locked up carbon (dioxide) is released

or

the carbon (dioxide) was absorbed millions of years ago

3

[4]

6.

(a) oxygen **and** nitrogen

1

20 – 21 % and 78 – 80 %

*accept any two correct responses in the correct space for **one** mark*

1

- (b) (i) acid rain
accept toxic gas or consequence of acid rain 1
- (ii) idea of the removal or use of sulfur dioxide gas (from the waste gases)
do not accept remove sulfur from coal 1
- (iii) oxygen
accept O₂ 1
- water
accept H₂O
accept hydrogen oxide / steam 1
- (c) any **two** from:
- it's a 'greenhouse gas' or increase greenhouse effect
accept action of a 'greenhouse gas'
 - causes global warming or increase in the Earth's temperature
 - sea-levels rise or flooding
 - climate change
 - (polar) ice-caps melt
 - extension of deserts
mention of ozone / acid rain / global dimming = max 1 mark 2
- (d) idea trap / store / lock the carbon dioxide 1
- in the oil reservoir or under the sea bed
do not accept 'into the oil' / 'under the sea' 1

[10]