

MARK SCHEME

GCSE

CHEMISTRY

AQA - TRIPLE SCIENCE

C9 - TEST 6
ATMOSPHERE
Advanced

Mark schemes

1.

(a) any **two** 1 mark each

burning / combustion

fossil fuels **or** (locked up) carbon

accept fuel / named fuel

oxygen used

2

(b) any **three** from

produces (calcium) carbonate

which is insoluble

produces (calcium) hydrogencarbonate

which is soluble

photosynthesis

releases oxygen

3

[5]

2.

(a) any **two** from:

*asks for cause therefore no marks for just describing the change
must link reason to a correct change in a gas*

carbon dioxide has decreased due to:

accept idea of 'used' to indicate a decrease

- plants / microorganisms / bacteria / vegetation / trees
- photosynthesis
ignore respiration
- 'locked up' in (sedimentary) rocks / carbonates / fossil fuels
- dissolved in oceans
ignore volcanoes

oxygen has increased due to:

accept idea of 'given out / produced'

- plants / bacteria / microorganisms / vegetation / trees
- photosynthesis
ignore respiration

nitrogen increased due to:

accept idea of 'given out / produced'

- ammonia reacted with oxygen
- bacteria / micro organisms
ignore (increase in) use of fossil fuels / deforestation

2

(b) (because methane's) boiling point is greater than the average / surface temperature
or Titan's (average / surface) temperature is below methane's boiling point

*ignore references to nitrogen **or** water*

1

any methane that evaporates will condense

accept boils for evaporates

accept cooling and produce rain for condensing

1

(c) C_nH_{2n}

1

[5]

3.

(a) nitrogen and oxygen

both required either order

1

(b) (i) any **two** from
(atmosphere) is now cooler water vapour has condensed
to form sea(s) / ocean(s) 2

(ii) any **two** from
has dissolved in / reacted with seawater has formed carbonates
(evolution of green) plants removed by photosynthesis
has formed fossil fuels 2

(c) (i) 225
accept any date in the Triassic period
225 – 191 (mya)
do not credit 190 (mya) 1

(ii) on different (tectonic) plates
or answer refers to African and South American plates 1

(movement) due to convection currents in the mantle 1

due to energy / heat from the core
or due to radioactivity 1

[9]

4.

(a) (i) burning / breathing / respiration / fuels / food
for 1 mark each 2

(ii) 1. rock is heated / subducted (owtte) / close to magma / melted
1. rock is decomposed / carbon dioxide released through volcanoes
for 1 mark each 2

(b) carbon dioxide reacts / dissolves in sea-water / dissolves in rain water
insoluble carbonates / calcium carbonate are / is formed carbon dioxide turned into shells /
coral / limestone / chalk / sediments also soluble hydrogencarbonates (calcium /
magnesium) are formed photosynthesis by plants
any three for 1 mark each 3

(c) (i) sea unable to absorb all the extra carbon dioxide being produced
more trees being cut down / deforestation increased burning of fuels / more cars /
more industry (*not* more people)
any one for 1 mark 1

- (ii) global warming / greenhouse effect or effects such as melting ice caps / rising sea levels / climatic change / more deserts
(not changes to ozone layer)

for one mark

1

[9]

5.

- (a) 72/24

an answer of 3 (mm / year) scores 2 marks

1

$$= 3 \text{ (mm / year)}$$

an answer of 3.125 (mm / year) scores 1 mark

1

(b) **Level 3 (5-6 marks):**

Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

Level 2 (3-4 marks):

Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

Level 1 (1-2 marks):

Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

Level 0

No relevant content

Indicative content

description

- global air temperature has risen overall / erratically
- mean sea level has risen (steadily)
- carbon dioxide has risen steadily
- methane has risen overall / erratically

explanations

- (carbon dioxide increase because) increase in fossil fuel combustion
or
- (carbon dioxide increase because) increase in deforestation
- methane from cattle / landfill / rice plantations
- carbon dioxide and / or methane trap heat
or
- carbon dioxide and / or methane are greenhouse gases
- polar ice caps melt
or
- seawater expands

linked explanation

- greenhouse gases linked to temperature rise
- temperature rise linked to seawater level

6

(c) any **two** from:

- bias
- simplified models
- lack of peer review
ignore reproducible

2

[10]

6.	<p>(a) incomplete combustion</p> <p>(because) insufficient / limited oxygen supply</p>	<p>1</p> <p>1</p>
	<p>(b) any two from:</p> <ul style="list-style-type: none"> • carbon monoxide toxic / poisonous <i>allow description of how carbon monoxide is toxic / poisonous</i> <i>ignore carbon monoxide is harmful / dangerous / deadly</i> • greater public concern / awareness about pollution <i>ignore comments about the effects of other pollutants</i> <i>ignore unspecified comments about carbon monoxide pollution</i> • more cars so otherwise there would be more carbon monoxide entering atmosphere • improved engine technology • catalytic converters have been introduced 	<p>2</p>
	<p>(c) any one from:</p> <ul style="list-style-type: none"> • (to reduce) health problems <i>allow (to reduce) specified health problems e.g. breathing difficulties, asthma, lung cancer</i> • (to reduce) global dimming <i>allow (to reduce) the effects of global dimming e.g. reduced light levels</i> <i>allow (to reduce) smog</i> <i>allow (to reduce) the formation of particulates</i> <i>ignore global warming</i> <i>do not accept to reduce soot</i> 	<p>1</p>
	<p>(d) nitrogen (from atmosphere) reacts with oxygen (from atmosphere)</p> <p>at high temperature (in engine) <i>ignore heat / hot</i></p> <p>or</p> <p>with a spark (from spark plug)</p>	<p>1</p> <p>1</p>
	<p>(e) $2 \text{NO}_2 \rightarrow \text{N}_2 + 2 \text{O}_2$</p> <p><i>allow multiples</i> <i>if incorrect, allow N_2 for 1 mark</i></p>	<p>2</p>

(f) any **one** from:

- acid rain

allow specific effects of acid rain

- respiratory problems

allow specific respiratory problems e.g. breathing difficulties, asthma

- carbon monoxide

- global dimming **or** smog

2

max 1 mark if global warming mentioned

(g) transition metals

1

[12]