

MARK SCHEME

GCSE

CHEMISTRY

AQA - COMBINED SCIENCE

C9 - TEST 4

CHEMISTRY OF THE ATMOSPHERE

Intermediate

Mark schemes

- 1.** nitrogen – Gas A (or N₂) (N) = 1)
oxygen – Gas B (or O₂) (O)
for 1 mark each

[2]

- 2.** (a) methane 1

- (b) any **two** examples from:
allow effects from the same bullet point

- rising sea levels
- melting ice
- agricultural problems
- extremes of weather
- loss of habitats

ignore global warming

ignore acid rain

ignore global dimming

*do **not** accept reference to ozone*

2

- (c) $\frac{6.0}{4.1} \times 0.0235$ 1

= 0.0344(kg)

allow correct rounding

allow calculator reading

if no mark awarded:

allow 1 mark for 34.4 or 0.344

allow 2 marks for 34.4 g

1

an answer of 0.0344(kg) scores 2 marks

- (d) use less plastic
or
use recycled plastic

allow carbon capture

ignore any reference to energy / fuels

1

- (e) **Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to give 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

nitrogen increased

- because volcanoes produced nitrogen
- because (denitrifying) bacteria produced nitrogen
- because ammonia was converted to nitrogen

oxygen increased

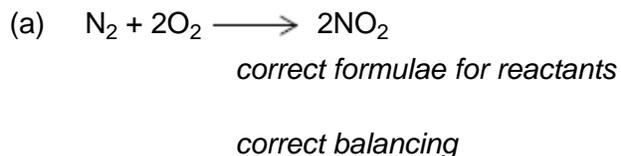
- because algae and plants produced oxygen
- by photosynthesis

carbon dioxide decreased

- because algae and plants used carbon dioxide
- by photosynthesis
- because oceans formed and carbon dioxide dissolved in the water
- because carbon dioxide formed carbonates, which precipitate as sediments or formed sedimentary limestone rocks
- because algae / plants and animals formed fossil fuels / coal / crude oil / natural gas

[12]

3.



1

1

(b) $2.96 - 0.98$
correct values read from graph

1

$$1.98 \div 2.96 (\times 100)$$

allow ecf from readings from graph

1

$$= 66.9(\%)$$

allow 66.9 shown without working for the 3 calculation marks

1

incorrect number of sig. figs max 2 marks

- (c) less acid rain **or** fewer respiratory problems in humans

allow improved air quality

1

[6]

4.

- (a) (i) H_2O

must be formula

1

CaO

must be formula

1

- (ii) carbon dioxide from the air / (Earth's early) atmosphere

it = carbon (dioxide)

accept carbon dioxide from millions of years ago

1

formed (sedimentary) rocks **or** fossil fuels

ignore trapped / stored

1

- (b) (i) decreases rapidly at first

it = carbon (dioxide)

1

then slowly **or** levels off

*allow both marks if the description is correct using either 'rapidly' **or** 'slowly'*

allow correct use of figures for either marking point

if no other mark awarded, allow CO_2 decreased for 1 mark

1

(ii) any **two** from:

it = carbon (dioxide)

accept photosynthesis

- used by plants
- dissolved in oceans
- 'locked up' in fossil fuels **or** formed fossil fuels
- 'locked up' in rocks **or** formed rocks

2

(c) (yes)

it = percentage of carbon (dioxide)

ignore yes or no

because the percentage of carbon dioxide is increasing

1

which causes global warming (to increase)

allow (carbon dioxide) causes greenhouse effect/climate change

1

or

(no)

because the percentage of carbon dioxide is low (1)

compared to millions of years ago (1)

allow global warming can be caused by other factors (e.g. Sun / water vapour / methane)

[10]

5.

(a) **either** any **two** points (1) each from

* (surface) below 100 °C (the surface) below the boiling point of water

* (allowed the) condensation (of water vapour)

accept (rate of) condensation greater than (the rate of) evaporation

* from the atmosphere

accept from the air

or condensed water (vapour) (1)

was pulled by gravity into depressions (1)

or idea of impervious sea bed

or from comets (which crashed on the Earth) (1)

ice (from these) melted (1)

2

(b) any **two** processes (1) each from

* dissolving in (sea) water

* (taken in during) photosynthesis

*accept taken in by algae **or** plants*

- formation of carbonate(s)
or calcium carbonate **or** chalk **or** calcite

*accept formation of shells **or** bones **or** corals*

2

[4]

6.

(a) (i) 214 (billion tonnes)

allow 1 mark for reading 122 and 92 correctly

allow 1 mark for the correct addition of incorrect readings

2

(ii) 18.35

allow 18.4

*do **not** allow 18.3*

1

(b) (i) (only) a small mass of carbon (dioxide) is released from burning fuels (compared to other processes)

allow the carbon (dioxide) released from other processes / respiration and decomposition is (much) greater

1

(ii) any **two** from:

- (more) plants would absorb (more) carbon (dioxide)
- (due to more) photosynthesis
- fewer animals would release less carbon (dioxide)
- (due to less) respiration (in animals).

an idea of a reduction is needed at least once

ignore references to oxygen

2

[6]

7.

(a) any **three** from:

accept reverse answers if unambiguous

*do **not** accept just different throughout*

3

less / little / not much carbon dioxide **or** give a %age < 1%

more / a lot of nitrogen **or** give 78-80%

(more) / (some) oxygen or give a %age 20-21%

*do **not** accept more "other gases"*

references to pollutant gases in general **or** named examples

e.g. CO, SO₂, NO, NOX etc.

more / some water (vapour)

some / 1% argon

ignore other noble gases

ozone (layer) on earth

(b) any **two** from:

removed carbon dioxide

ignore reference to respiration /

photosynthesis unless qualified

released oxygen

caused carbon from carbon dioxide to
become locked in sedimentary rocks

the oxygen they produced reacted with
methane and ammonia

produced nitrogen (must be linked to fourth point)

*accept correct word / symbol equation for photosynthesis for **2**
marks*

*converted / changed CO₂ to oxygen for **2** marks*

2

[5]