# MARK SCHEME

# GCSE

## CHEMISTRY

## AQA - COMBINED SCIENCE

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## C9 - TEST 4

## CHEMISTRY OF THE ATMOSPHERE

## Intermediate

# Mark schemes

**1.** nitrogen – Gas A (or $N_2$) (N) = 1)
oxygen – Gas B (or $O_2$) (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.**

(a) $N_2 + 2O_2 \longrightarrow 2NO_2$

*correct formulae for reactants*

**1**

*correct balancing*

**1**

(b) 2.96 − 0.98

*correct values read from graph*

**1**

1.98 ÷ 2.96 (×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

*an idea of more is needed at least once*

- 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, $SO_2$, 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 $CO_2$ to oxygen for **2** marks*

**2**

**[5]**