

Mark schemes

Q1.

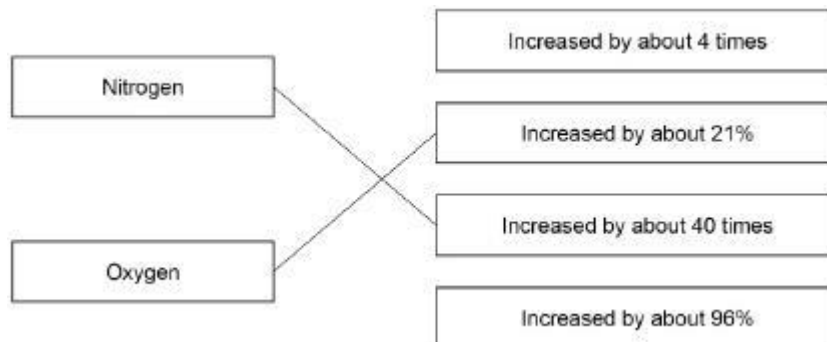
(a) 4.6 billion years ago

1

(b) 0.92 (%)

1

(c)



do **not** accept more than one line from
a box on the left 1

1

1

(d) carbon dioxide dissolving in sea water

1

formation of sedimentary rocks

1

(e) carbon dioxide (+ water →)

allow CO_2

1

(→ glucose +) oxygen

allow O_2

1

(f) evidence / proof

1

[9]

Q2.

(a) **test:** (use a) glowing splintdo **not** accept burning splint

1

result: relights

dependent on correct test in MP1

ignore with a pop

1

- (b) starch 1
- cellulose
allow glycogen 1
- (c) 2 1
- (d) water
allow H₂O 1
- (e) ammonia 1
- nitrogen
if no other mark awarded, allow 1 mark for NO / NO₂ / N₂O / NO_x or equivalent named compounds 1
- (f) two polymer chains
allow two polymer strands 1
- four (different) monomers / nucleotides
*allow four (different) bases
allow cytosine, guanine, adenine and thymine
allow C G A T* 1
- (double) helix
*allow spiral
if no other mark awarded, allow 1 mark for DNA* 1
- [11]**

Q3.

- (a)
- in either order, both required for mark
allow phonetic spellings*
- nitrogen
allow N₂ for nitrogen
- and**
methane
allow CH₄ for methane 1

(b)

ignore width of bars
ignore additional bars

nitrogen bar to 78%

1

oxygen bar to 21%

1

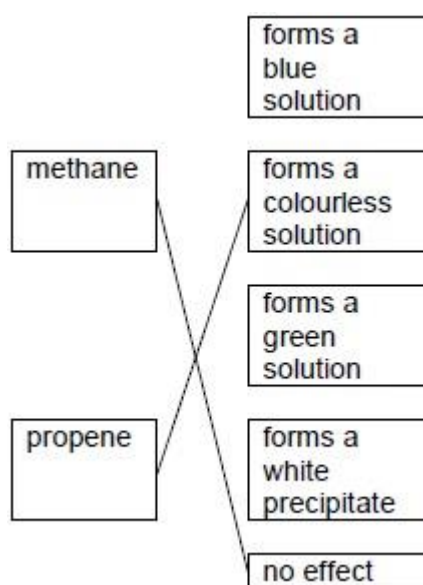
(c) Titan's atmosphere contains too little carbon dioxide.

1

(d) long wavelength radiation is reflected back to the surface of Titan.

1

(e)



*an extra line from a gas to an effect on
 bromine water negates that mark*

2

(f)

an answer of 49 (g) scores 2 marks.

$$\frac{7 \times 21}{3}$$

1

$$= 49 \text{ (g)}$$

1

[9]

Q4.

(a) (Titan has) little / no oxygen
ignore references to respiration

1

(so) photosynthesis has not occurred (on Titan)

- allow (so) no plants / algae to produce oxygen (on Titan)* 1
- (therefore) little / no carbon dioxide present (on Titan)
or
 (therefore) oxygen-using animals cannot have evolved (on Titan) 1
- (b) (methane) allows short(er) wavelength radiation to pass through (from the sun)
allow (methane) allows uv / ultraviolet radiation to pass through (from the sun) 1
- (which is) re-emitted from the surface as long(er) wavelength radiation
allow (which is) re-emitted from the surface as ir / infra-red radiation 1
- (which is) absorbed (by methane in the atmosphere)
allow (which is) trapped (by methane in the atmosphere) 1
- if no other mark is awarded, allow 1 mark for methane absorbs long(er) wavelength radiation*
or
methane absorbs ir / infra-red radiation
- (c) (add) bromine (water)
*do **not** accept bromide* 1
- (changes from) orange to colourless
dependent on correct test in MP1
allow (changes from) brown to colourless
ignore clear 1
- [8]**

Q5.

- (a) hydrogen
allow H₂ 1
- (b) 450 °C
allow values in the range 400–500 °C 1
- 200 atm / atmospheres
allow values in the range 150–250 atm /

- atmospheres*
allow 1 mark if both values within range
but no units given
- 1
- (c) ammonia has a higher boiling point
allow the other gases have lower boiling points
ignore references to melting point
- 1
- (d) **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 logical 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**
- changes**
- carbon dioxide has decreased
 - oxygen has increased
- processes**
- volcanic activity released water vapour
 - the water vapour condensed to form oceans
 - carbon dioxide dissolved in oceans
 - carbonates produce sediments
 - carbon locked up in sedimentary rocks
 - algae and plants evolved / appeared
 - algae / plants absorbed carbon dioxide by photosynthesis
 - which also released oxygen
 - carbon locked up in fossil fuels
- (e) any **one** from:
- occurred 4.6 billion years ago
allow any indication of billions of years
allow limited or no proof
 - limited or no evidence
ignore there was nobody there

1
[11]

Q6.

- (a) the Earth's (surface) temperature was high **or** at/above 100 °C

*allow the Earth's (surface) temperature was too /
very hot **or** water evaporated / boiled **or** turned to
steam / gas*

allow because of heat from volcanoes

*ignore the Earth's (surface) was covered by
volcanoes*

ignore water turned to water vapour

1

- (b) (i) air ————— mixture

1

carbon dioxide ————— compound

1

argon ————— element

1

allow only one line from each substance

- (ii) oxygen

1

- (iii) about 80 %

1

- (c) (i) 0.03(0) (%)

1

- (ii) increased

1

slowly then rapidly

1

allow figures from graph to indicate increase

- (iii) any **two** from:

- use of fossil fuels
- deforestation
allow less trees / plants
- cars/transport
- industry/factories
ignore more people

2

[11]