

MARK SCHEME

GCSE

CHEMISTRY

AQA - TRIPLE SCIENCE

C9 - TEST 5
ATMOSPHERE
Advanced

Mark schemes

1.

- (a) amount of CO₂ (much) lower
amount of O₂ (much) higher
amount of N₂ (much) higher (owtte.)
less other gases/less NH₃/less CH₄

any 2 for 2 marks

2

- (b) 4 points from:
plants (evolved)/photosynthesis/algae
take in CO₂
give out O₂
water vapour condensed
ozone formed from oxygen
less CO₂ is produced now from volcanic activity
CO₂ from air trapped in sedimentary rocks or fossil fuels
nitrogen produced by bacteria/living organisms/microbes/decay of dead organisms (**not** nitrifying bacteria, nitrogen fixing 4 bacteria)
nitrogen produced by reaction of NH₃ with O₂/decomposition of NH₃
nitrogen builds up because it is unreactive

(Assume answer refers to today's atmosphere)

any 4 for 1 mark each

4

[6]

2.

(a) any **two** environmental problems with linked explanations

- global warming (1)
accept effects of global warming
caused by (formation of) carbon dioxide / greenhouse gas (1)
ignore greenhouse effect
- acid rain (1)
accept effects of acid rain
ignore respiratory problems
caused by (formation of) sulfur dioxide (1)
accept sulfur oxide
ignore sulfuric acid
- global dimming (1)
ignore respiratory problems
caused by (formation of) particles / particulates / fires /
smoke / carbon / pm 10 (1)
- scarring of landscape (1)
caused by mining / quarrying of coal (1)
ignore ozone layer

max 4

(b) any **three** from:

- replant the trees / renewable / sustainable
ignore reusable
- carbon dioxide is used by the trees / photosynthesis
accept trees absorb carbon dioxide as they grow
*do **not** allow respiration*
- it's a (continuous carbon) cycle
accept 'carbon dioxide goes back into the air'
accept trees use CO₂ which is released when trees are burnt
- no 'new' carbon (dioxide) is produced **or**
no locked up carbon (dioxide) is released
accept no carbon (dioxide) from fossil fuels is produced

3

[7]

- 3.** (a) any **one** from:
- complex systems
 - many different variables
 - many alternative theories
- 1
- (b) carbon dioxide allows short wavelength radiation to pass through
allow greenhouse gas(es) for carbon dioxide
- 1
- the atmosphere to the Earth's surface
- 1
- carbon dioxide absorbs outgoing long wavelength radiation
- 1
- (c) general increase in temperature caused by increase in greenhouse gases
- 1
- any **two** human activities correctly linked to a named greenhouse gas
- eg*
- increased burning of fossil fuels causes more carbon dioxide*
- 2
- deforestation causes more carbon dioxide*
- more cattle production causes more methane*
- use of landfill causes more methane*
- [7]
- 4.** (a) carbon / diesel / it reacts / burns in oxygen / air
- 1
- limited supply (of oxygen / air)
- accept incomplete combustion*
- $2C + O_2 \rightarrow 2CO$ **or**
- $C + CO_2 \rightarrow 2CO$ **gains 2 marks**
- 1

(b) any **four** from:

accept converse statements for fossil diesel.

ignore cost / ease of manufacture / usage issues

for biodiesel:

- less global dimming (because fewer carbon particles)
- less acid rain (because less sulfur dioxide)
if neither point awarded, fewer carbon particles and less sulfur dioxide = 1 mark
- renewable resource / sustainable
accept fossil fuel / diesel supplies are limited
- use waste vegetable oils / fats
- vegetables / plants absorbed carbon dioxide / carbon neutral
accept fossil fuel / diesel releases locked up carbon / is not carbon neutral
- uses land which could be used to produce food
- third world countries can produce bio diesel
- biodegrades easily
- more NO_x released

4

justified conclusion

1

[7]

5.

(a) 95% (1 mark for working)

2

(b) Much less carbon dioxide
Much more nitrogen

2

(c) Plants take up CO₂
plants give out oxygen
when they die trap CO₂ in rocks and fossil fuels
methane and ammonia reacted with oxygen
nitrogen gas produced
by reaction of oxygen and ammonia
and by denitrifying bacteria
formation of ozone layer

any 4 for 1 mark each

4

[8]

6. (a) Sulfur dioxide causes acid rain. 1
- (b) red / orange / yellow
do not accept any other colours 1
- because sulfur dioxide (when in solution) is an acid 1
- (c) (there are) weak forces (of attraction)
do not accept any reference to covalent bonds breaking 1
- between the molecules
do not accept any other particles 1
- (these) take little energy to overcome
award third mark only if first mark given 1

- (d) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks

No relevant content

Level 1 (1 – 2 marks)

A relevant comment is made about the data.

Level 2 (3 – 4 marks)

Relevant comparisons have been made, and an attempt made at a conclusion.

Level 3 (5 – 6 marks)

Relevant, detailed comparisons made and a justified conclusion given.

examples of the points made in the response

effectiveness

- W removes the most sulfur dioxide
- D removes the least sulfur dioxide

material used

- Both W and D use calcium carbonate
- Calcium carbonate is obtained by quarrying which will create scars on landscape / destroy habitats
- D requires thermal decomposition, this requires energy
- D produces carbon dioxide which may cause global warming / climate change
- S uses sea water, this is readily available / cheap

waste materials

- W product can be sold / is useful
- W makes carbon dioxide which may cause global warming / climate change
- D waste fill landfill sites
- S returned to sea / may pollute sea / easy to dispose of

6

[12]