Atmosphere 2

Name: _____

Class: _____

Date: _____

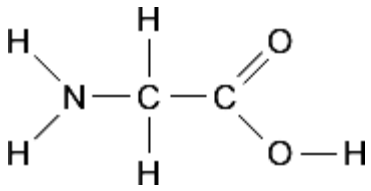
Time: **33 minutes**

Marks: **33 marks**

Comments:

1. Two scientists, Miller and Urey, investigated how simple gases that may have been present in the Earth's early atmosphere led to the formation of chemicals such as glycine. Glycine is found in living organisms.

The displayed (structural) formula of glycine is:



(a) Name **three** simple gases that could have been present in the Earth's early atmosphere that might combine to form glycine.

1. _____

2. _____

3. _____

(3)

(b) Describe the main differences between the Earth's early atmosphere and the atmosphere today.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(c) Air is a source of some gases used in industrial processes.

Name the process used to separate the gases in air.

Give the reason why this process can be used to separate the gases.

_____

_____

_____

_____

(2)

(Total 9 marks)

2. (a) **Table 1** shows the percentages of gases in the atmospheres of Earth and Mars.

Table 1

Gas	Percentage of gas (%)	
	Earth	**Mars**
Carbon dioxide	0.04	95
Nitrogen	78	3
Oxygen	21	0.13

Using **Table 1**, describe how the atmosphere of the Earth is different from the atmosphere of Mars.

_____

_____

_____

_____

(2)

(b) **Table 2** shows the mean surface temperature of three planets.

Table 2

	Earth	Mars	Venus
Mean surface temperature in °C	20	-23	460

Oceans cover 71% of the Earth's surface.

Mars and Venus have water vapour in their atmospheres.

Why does the water vapour **not** form oceans on their surfaces?

Mars: _____

_____

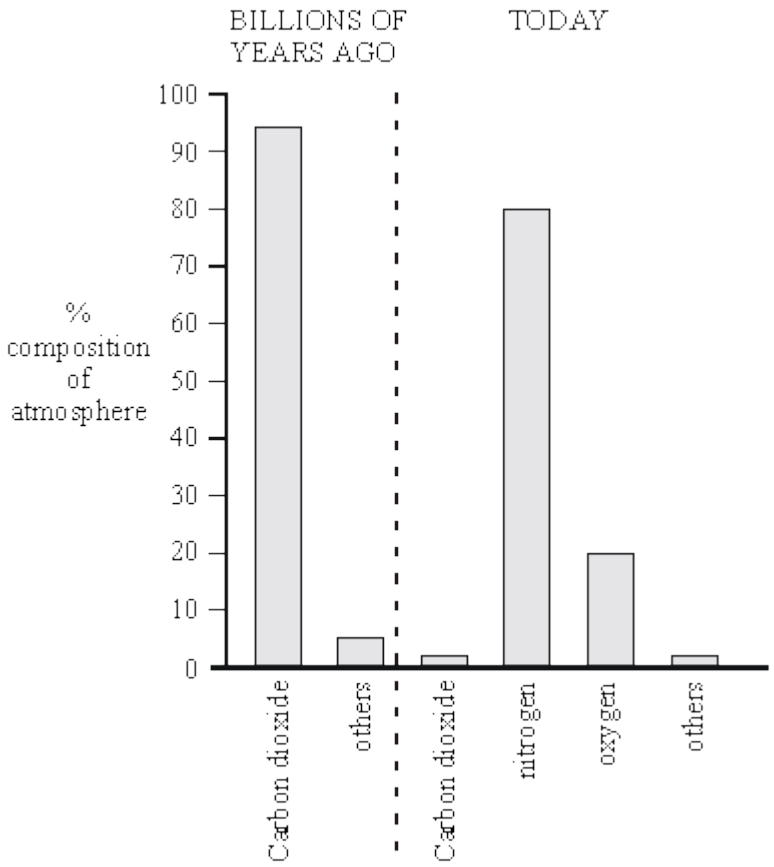
Venus: _____

_____

(2)

(Total 4 marks)

3. The bar chart shows the composition of the Earth's atmosphere today, and as it was billions of years ago.



(a) Use information from the bar chart to describe how the atmosphere today is different from the atmosphere of billions of years ago.

_____

_____

_____

_____

(2)

(b) Describe the processes which have brought about the changes in the proportions of these gases in the air over billions of years.

_____

_____

_____

_____

_____

_____

(4)

(Total 6 marks)

4. (a) For the last 200 million years the amount of carbon dioxide in the atmosphere has remained almost the same.

Describe the natural processes which remove carbon dioxide from the atmosphere.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

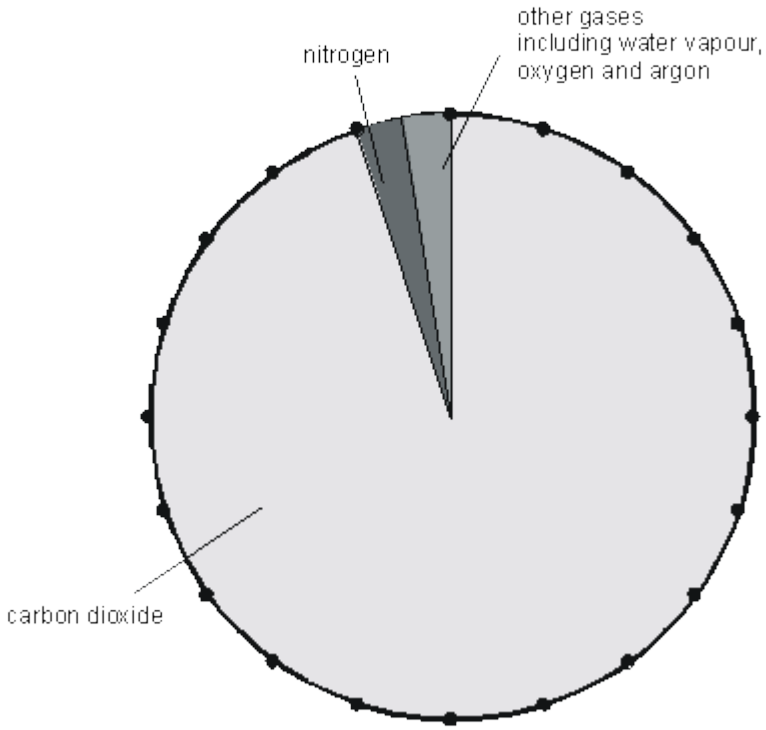
(4)

(b) The amount of carbon dioxide in the atmosphere has increased over the last one hundred years. Suggest **two** reasons why this has happened.

(2)

(Total 6 marks)

5. The pie chart below shows the composition of the atmosphere on the planet Mars.



(a) Use the pie chart above to calculate the percentage of carbon dioxide in the atmosphere on Mars.

_____

_____

_____%

(2)

(b) The atmosphere on Earth is very different from that on Mars. One important difference is that the Earth's atmosphere contains a large amount of oxygen.

Give **two** other ways in which the Earth's atmosphere is different from the atmosphere on Mars.

1. _____

_____

2. _____

_____

(2)

(c) When the Earth was formed its atmosphere is thought to have been similar to the atmosphere on Mars. Explain how green plants and other organisms have changed the composition of the Earth's atmosphere.

(4)

(Total 8 marks)

1. (a) *if <u>only</u> formula given it must be correct*

any **three** from:

- ammonia
  accept NH_3
- methane
  accept CH_4
  allow ethane / butane / propane
- hydrogen
  accept H_2
- water <u>vapour</u>
  accept H_2O <u>vapour</u> / steam
- carbon dioxide
  accept CO_2
- carbon monoxide
  accept CO
  allow oxygen / O_2
  allow nitrogen / N_2
  ignore nitrogen oxide
  ignore carbon

3

(b) (in atmosphere today)

ignore references to water vapour

allow converse

(much) less carbon dioxide / CO_2

allow carbon dioxide was the <u>main</u> gas (in Earth's early atmosphere)

1

more nitrogen / N_2

allow nitrogen is now the <u>main</u> gas (in the atmosphere today)

or

nitrogen is now 78 × 80%

1

<u>more</u> oxygen / O_2

1

no ammonia / NH_3 or less methane / CH_4 or more argon / Ar or more noble gases

allow less ammonia / NH_3

1

(c) (fractional) distillation

1

gases have different boiling points

allow gases condense at different temperatures

ignore condensing points / levels

ignore evaporating points / levels

1

[9]

2. (a) any **two** from:

(Earth has)

ignore figures unless qualified

allow converse responses

- smaller percentage carbon dioxide

  allow less

- larger percentage nitrogen

  allow more

- larger percentage oxygen

  allow more

2

(b) (Mars) temperature below freezing point of water

allow too cold (for liquid water to form)

allow water will freeze or ice will form

1

(Venus) temperature above boiling point of water

allow too hot (for liquid water to form)

allow water would boil or would be steam / gas

if no other mark awarded allow one mark for not enough water vapour

1

[4]

3. (a) amount of CO_2 (much) lower
amount of O_2 (much) higher
amount of N_2 (much) higher (owtte.)
less other gases/less NH_3/less CH_4

any 2 for 2 marks

2

(b) 4 points from:
plants (evolved)/photosynthesis/algae
take in CO_2
give out O_2
water vapour condensed
ozone formed from oxygen
less CO_2 is produced now from volcanic activity
CO_2 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 NH_3 with O_2/decomposition of NH_3
nitrogen builds up because it is unreactive
(Assume answer refers to today's atmosphere)

any 4 for 1 mark each

4

[6]

4. (a) **Quality of written communication**

for any two ideas sensibly stated

1

any **three** from:

- plants take in (CO_2)

  accept photosynthesis uses (CO_2)

- converted to glucose / starch / carbohydrates

  ignore carbon compounds by itself

- CO_2 locked up in fossil fuels

  accept coal / oil / natural gas / methane for fossil fuels

- CO_2 reacts with / dissolves (sea)water

  accept ocean removes CO_2

- producing hydrogencarbonates

  accept carbonic acid

- producing carbonates

  accept named carbonates

- marine animals use carbonates to make shells

  *do **not** accept bones*

- forms sedimentary rocks

  accept limestone / chalk
  accept marble
  *do **not** accept sediments alone*

3

(b) any **two** from:

- burning of fossil fuels **or** cars / industry / air travel / power stations

  ignore increase in population
  ignore more use of electricity

- natural processes cannot absorb all the extra CO_2

- deforestation

  accept less photosynthesis
  ignore volcanic activity
  accept burn trees

2

[6]

5. (a) 95% (1 mark for working)

2

(b) Much less carbon dioxide
Much more nitrogen

2

(c) Plants take up CO_2
plants give out oxygen
when they die trap CO_2 in rocks and fossil fuels
methane and ammonia reacted with oxygen
nitrogen gas produced
by reaction of oxygen and ammonia
and by denitryfying bacteria
formation of ozone layer

any 4 for 1 mark each

4

[8]