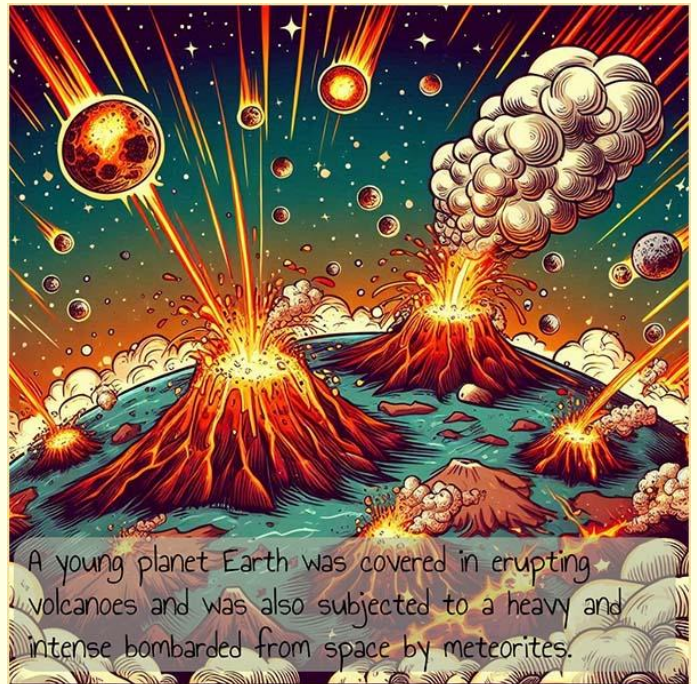


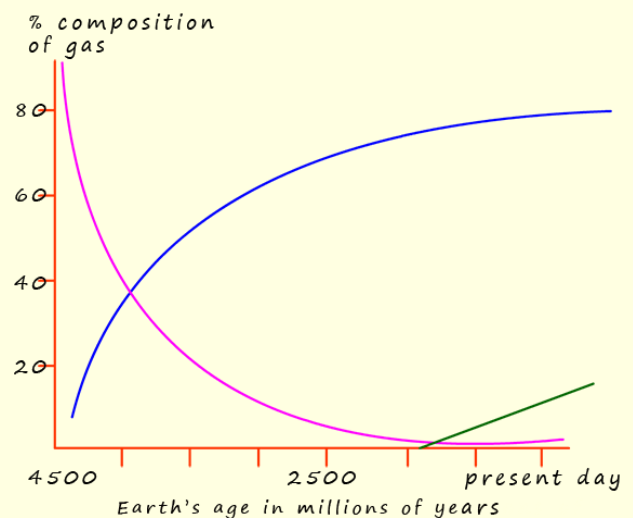
EVOLUTION OF THE EARTH'S ATMOSPHERE

Answer all the questions below then check your answers

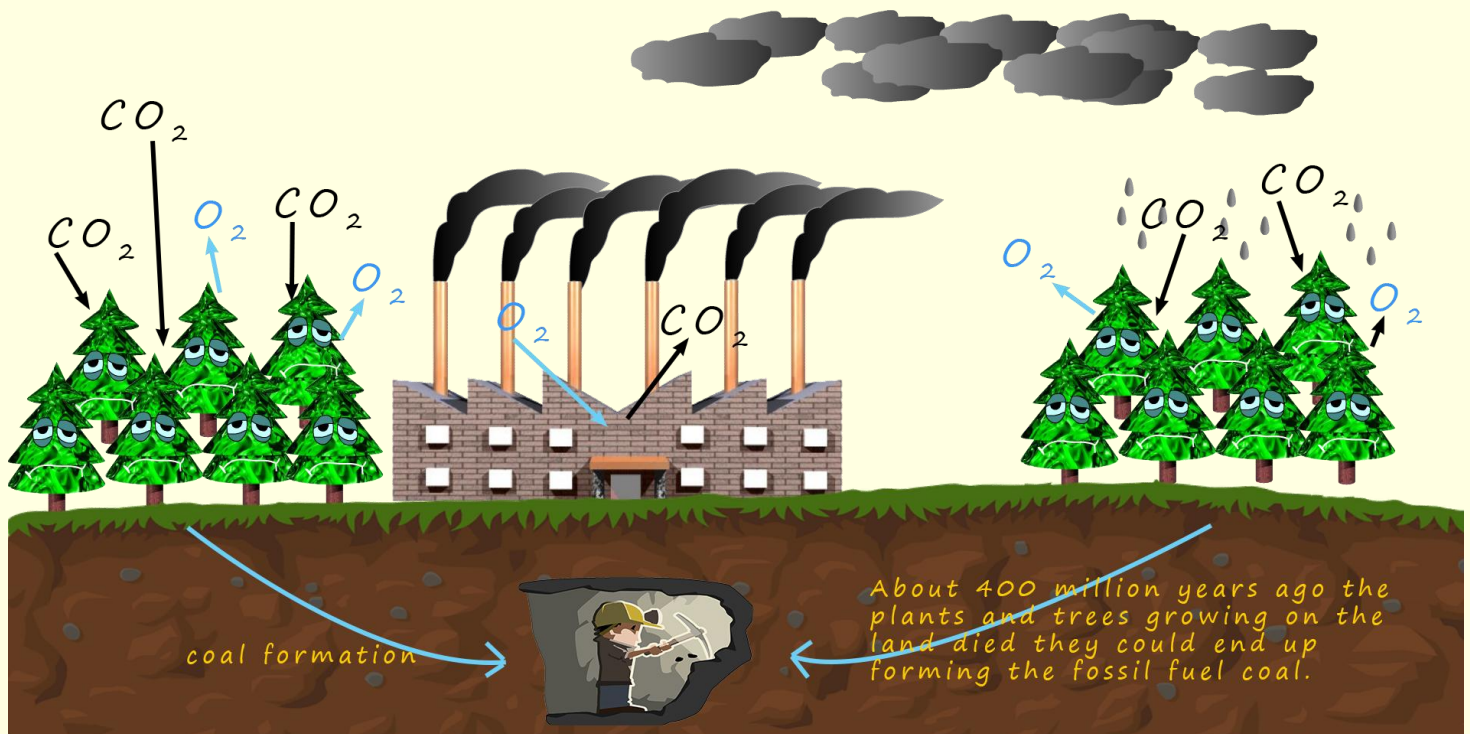
1. Where do scientists believe that the gases that formed the atmosphere came from?
2. What main gases do volcanoes release when they erupt?
3. Which gas made up most the Earth's early atmosphere? How much of this gas was present as a %?
4. The early Earth's atmosphere was similar to that the found on which planets today?



5. The graph below shows how the concentration of 3 gases in the Earth's atmosphere has changed over billions of years.
 - a. Which line represents carbon dioxide, the purple, green or blue line? Explain your answer



- b. What has happened to the % concentration of carbon dioxide in the Earth's atmosphere over the past 4.6 billion years?
- c. Suggest what has caused the changes in the concentration of carbon dioxide in the atmosphere.
- d. Which line represents nitrogen gas? Describe how the concentration of nitrogen has changed over the past 4.6 billion years.
 - i. Where has the nitrogen gas in the atmosphere come from?
- e. Which gas is represented by the green line? Where and how is this gas produced?
6. How do scientists think the early seas formed?
7. What were the first living organisms on Earth likely to have been?
8. What is ozone and why was it important for the evolution of life on land?
9. The image below shows possible ways in which carbon dioxide gas can enter and leave the atmosphere.



- a. *What process in the image above removes carbon dioxide from the air?*
- b. *What process in the image above adds carbon dioxide to the atmosphere?*

Answers

1. Where do scientists believe that the gases that formed the atmosphere come from?

Volcanic eruptions

2. What main gases do volcanoes release when they erupt?

Carbon dioxide, water vapour, nitrogen, ammonia, methane gases

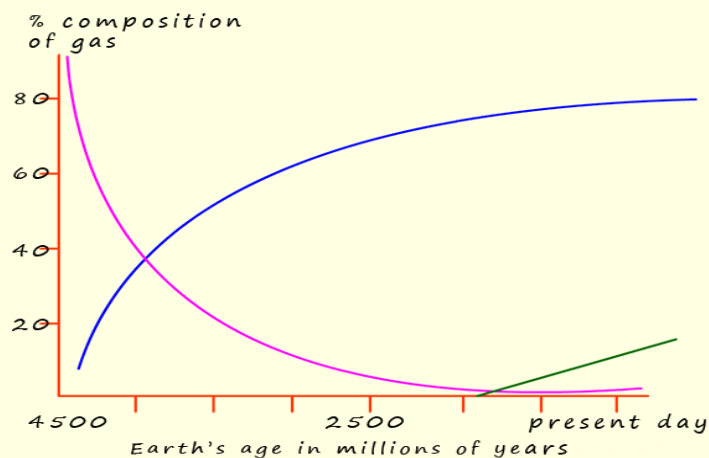
3. Which gas made up most the Earth's early atmosphere? How much of this gas was present as a %?

Carbon dioxide, around 96%, similar to atmospheres of Mars and Venus today.

4. The early Earth's atmosphere was similar to the found on which planets today?

Mars and Venus

5. The graph below shows how the concentration of 3 gases in the Earth's atmosphere has changed over billions of years.



a. Which line represents carbon dioxide? The purple, green or blue line? *Purple line*

b. What has happened to the % concentration of carbon dioxide in the Earth's atmosphere over the past 4.6 billion years?

Fallen from a high level around 96% to about 0.04% today

c. Suggest what has caused the changes in the % concentration of carbon dioxide in the atmosphere.

- Algae and other micro-organisms breath in carbon dioxide during photosynthesis.*
- With evolution of land plants more CO₂ taken in during photosynthesis.*
- Dissolves in oceans to form soluble hydrogen carbonates.*
- Became trapped in sedimentary rock and fossil fuels underground.*

d. Which line represents nitrogen gas? Describe how the concentration of nitrogen has changed over the past 4.6 billion years. *Blue line is nitrogen, released by volcanoes and since it is a very unreactive gas its levels slowly built up over time.*

i. Where has the nitrogen gas in the atmosphere come from?

Mostly from volcanic eruptions.

e. Which gas is represented by the green line? Where and how is this gas produced?

Oxygen gas, released by plants and algae during photosynthesis.

6. How do scientists think the early seas formed?

Steam released by volcanic eruptions condensed on Earth's surface once it had cooled down enough from early intense volcanic period.

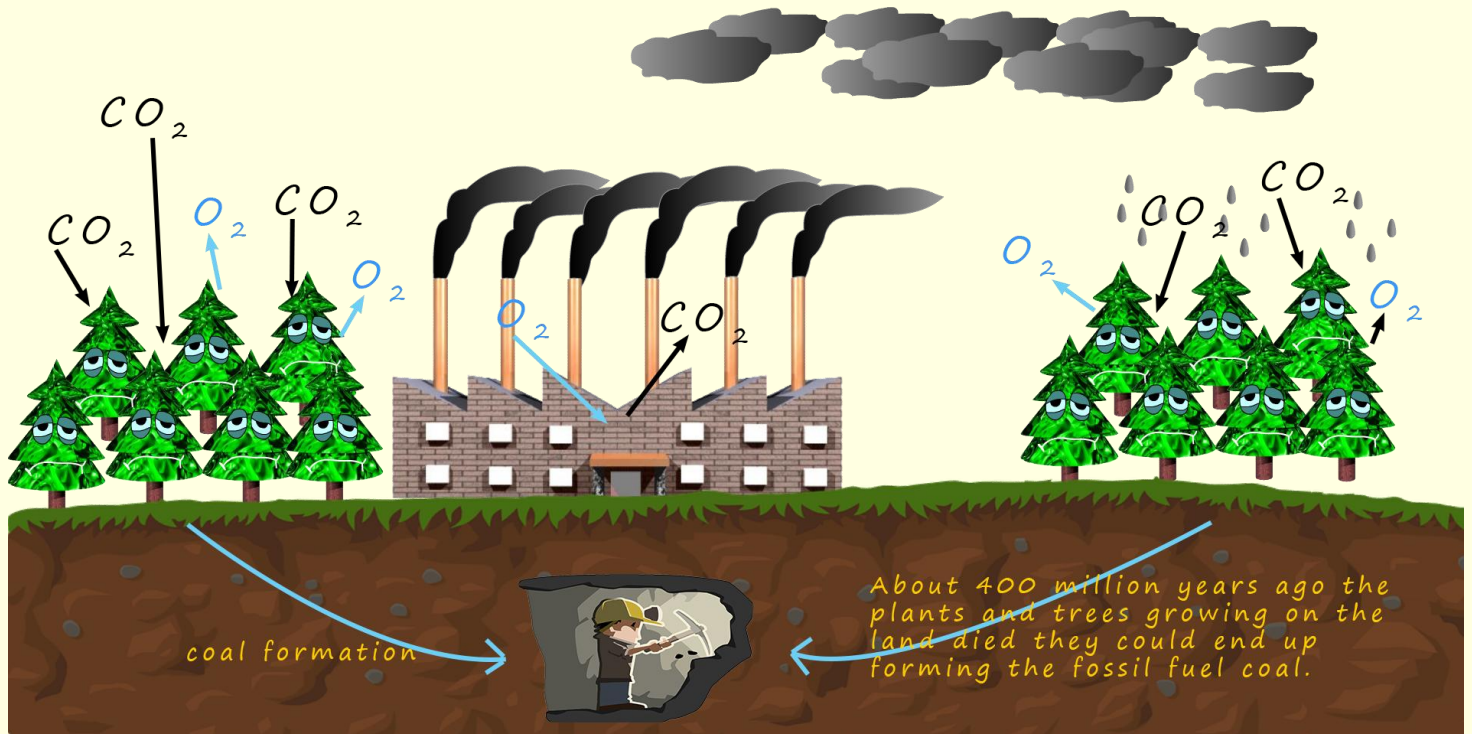
7. What were the first living organisms on Earth likely to have been?

Microorganisms such as cyanobacteria.

8. What is ozone and why was it important for the evolution of life on land?

Ozone is O_3 , formed from oxygen gas high up in stratosphere, reactive and toxic gas but high up in atmosphere it absorbs harmful ultraviolet radiation from the Sun. Once the ozone layer formed this allowed life to further evolve on land.

9 The image below shows possible ways in which carbon dioxide gas can enter and leave the atmosphere.



a. What process in the image above removes carbon dioxide from the air?

photosynthesis

b. What process in the image above adds carbon dioxide to the atmosphere?

combustion of coal in power stations/factories for energy