

AQA (GCSE Notes)

Chapter 9: Chemistry of the Atmosphere

- Q1. What are the main gases in the Earth's atmosphere today and their approximate percentages?
- Q2. Name three other gases found in small amounts in the atmosphere besides nitrogen and oxygen.
- Q3. For approximately how long have the proportions of gases in the atmosphere remained fairly constant?
- Q4. Which gas makes up about 80% of the Earth's atmosphere?
- Q5. Which gas makes up about 20% of the Earth's atmosphere?
- Q6. What role do noble gases play in the atmosphere?
- Q7. How can percentages be used to describe the composition of the atmosphere?
- Q8. How would you express the proportion of nitrogen in the atmosphere as a fraction?
- Q9. How would you express the proportion of oxygen in the atmosphere as a ratio?
- Q10. Which gas was the most abundant in the early Earth's atmosphere?
- Q11. What caused the release of gases that formed the early atmosphere?
- Q12. What is believed to have released water vapour into the early atmosphere?
- Q13. What happened to the water vapour once the Earth cooled?
- Q14. How did the formation of oceans affect the amount of carbon dioxide in the atmosphere?
- Q15. What type of compounds were formed when carbon dioxide dissolved in the oceans?
- Q16. How were sediments formed in the early oceans?
- Q17. Which gas increased in the atmosphere due to volcanic activity?
- Q18. Name two gases, other than carbon dioxide and nitrogen, thought to be in the early atmosphere.
- Q19. Why is it difficult to be certain about the composition of the early atmosphere?
- Q20. How long ago did scientists believe the Earth formed?



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- Q21.** What do the atmospheres of Mars and Venus consist mainly of?
- Q22.** Why is the early Earth's atmosphere compared to Mars and Venus?
- Q23.** What is one reason the amount of carbon dioxide in the atmosphere decreased?
- Q24.** Why might there have been no oxygen in the early atmosphere?
- Q25.** What evidence do scientists use to develop theories about the early atmosphere?
- Q26.** How do sediments provide evidence for early atmospheric changes?
- Q27.** How did volcanic eruptions help form the early atmosphere?
- Q28.** What process removed carbon dioxide from the early atmosphere?
- Q29.** Why do scientists use models to understand the Earth's early atmosphere?
- Q30.** What challenges do scientists face when studying the Earth's early atmosphere?
- Q31.** Explain how water vapour could have contributed to the formation of oceans.
- Q32.** Why might ammonia and methane have been present in the early atmosphere?
- Q33.** What happens when carbon dioxide dissolves in water?
- Q34.** What evidence supports the idea that the early atmosphere was mainly carbon dioxide?
- Q35.** How do volcanic gases today help us understand the early atmosphere?
- Q36.** Why is nitrogen believed to have built up in the early atmosphere?
- Q37.** Why do scientists believe the early Earth had a lot of volcanic activity?
- Q38.** How might ammonia and methane have affected the early Earth?
- Q39.** What is the importance of evaluating different theories about the early atmosphere?
- Q40.** What is a possible reason for limited evidence about the Earth's early atmosphere?
- Q41.** How might the presence of carbonates in sedimentary rocks be used as evidence?
- Q42.** How could you describe the change in atmospheric gases over time?
- Q43.** What caused the first major changes in atmospheric gas composition?
- Q44.** How might studying other planets help us understand the Earth's past?



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- Q45.** Why is there more certainty about the current atmosphere than the early one?
- Q46.** What role did oceans play in shaping the atmosphere?
- Q47.** What process allowed nitrogen to become a major part of the atmosphere?
- Q48.** How do ratios help us describe atmospheric gases?
- Q49.** What could be the result if volcanic activity had not released gases?
- Q50.** How has the composition of the atmosphere helped support life on Earth?
- Q51.** How did algae contribute to the increase of oxygen in the Earth's atmosphere?
- Q52.** Why did the percentage of oxygen in the atmosphere increase after plants evolved?
- Q53.** What process do algae and plants use to produce oxygen?
- Q54.** What is the balanced word equation for photosynthesis?
- Q55.** Why is the appearance of oxygen in the atmosphere around 2.7 billion years ago considered important for life?
- Q56.** What role did photosynthesis play in changing the composition of Earth's early atmosphere?
- Q57.** How does the activity of aquatic plants in daylight demonstrate the production of oxygen?
- Q58.** Why could animals only evolve after the oxygen level in the atmosphere increased?
- Q59.** How did carbon dioxide levels decrease due to the actions of algae and plants?
- Q60.** How does the formation of sedimentary rocks reduce carbon dioxide in the atmosphere?
- Q61.** What type of carbon-containing rocks formed from marine organisms' shells?
- Q62.** How does the formation of fossil fuels contribute to the reduction of carbon dioxide?
- Q63.** Describe the process through which coal is formed from dead plant material.
- Q64.** Explain how crude oil and natural gas are formed over millions of years.
- Q65.** What conditions are required for the formation of fossil fuels from dead organisms?
- Q66.** Why is limestone considered a carbon store?
- Q67.** Describe one geological process that helps reduce carbon dioxide in the atmosphere.



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- Q68.** Why do carbon stores such as fossil fuels represent long-term removal of carbon from the atmosphere?
- Q69.** What impact did early photosynthetic organisms have on Earth's climate?
- Q70.** Describe how the carbon cycle is linked to atmospheric changes.
- Q71.** What is meant by a greenhouse gas?
- Q72.** How does water vapour contribute to the greenhouse effect?
- Q73.** Why are carbon dioxide and methane considered greenhouse gases?
- Q74.** What happens to short wavelength radiation from the Sun when it reaches Earth?
- Q75.** What happens to the energy emitted by Earth as long wavelength radiation?
- Q76.** How do greenhouse gases trap energy in the Earth's atmosphere?
- Q77.** Describe how the greenhouse effect keeps Earth warm enough to support life.
- Q78.** Why is the greenhouse effect important for maintaining life on Earth?
- Q79.** What could happen if greenhouse gas levels increase significantly?
- Q80.** How does deforestation affect the level of carbon dioxide in the atmosphere?
- Q81.** How can human activities contribute to rising methane levels?
- Q82.** What is the role of agriculture in the production of greenhouse gases?
- Q83.** How does burning fossil fuels affect the composition of the atmosphere?
- Q84.** Why is it difficult to reverse the effects of increased greenhouse gas emissions?
- Q85.** Explain the link between fossil fuel usage and climate change.
- Q86.** What natural processes help remove carbon dioxide from the atmosphere?
- Q87.** How might volcanic activity have influenced early atmospheric conditions?
- Q88.** Why did Earth's early atmosphere have a high concentration of carbon dioxide?
- Q89.** Describe how carbon is cycled through living organisms and the atmosphere.
- Q90.** What evidence suggests that oxygen appeared in the atmosphere about 2.7 billion years ago?



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- Q91.** What would happen to Earth's temperature without greenhouse gases?
- Q92.** Why are greenhouse gases compared to a blanket around the Earth?
- Q93.** Describe how the greenhouse effect involves energy transfer between the Sun, Earth, and the atmosphere.
- Q94.** Why does methane have a stronger greenhouse effect than carbon dioxide?
- Q95.** How do oceans help regulate the level of carbon dioxide in the atmosphere?
- Q96.** How is carbon dioxide involved in the formation of limestone?
- Q97.** What role do marine organisms play in carbon dioxide removal?
- Q98.** Why does photosynthesis reduce the greenhouse effect?
- Q99.** How might future changes in fossil fuel usage affect global temperatures?
- Q100.** What are two ways that humans can reduce the release of greenhouse gases?
- Q101.** What is the name of the process by which human activities are increasing the Earth's surface temperature?
- Q102.** Name two human activities that increase the amount of carbon dioxide in the atmosphere.
- Q103.** Name two human activities that increase the amount of methane in the atmosphere.
- Q104.** Explain how deforestation can lead to an increase in atmospheric carbon dioxide.
- Q105.** How does burning fossil fuels contribute to the greenhouse effect?
- Q106.** Describe how farming cattle increases methane levels in the atmosphere.
- Q107.** How does the decay of organic matter in landfill sites increase methane emissions?
- Q108.** Why is it difficult to create accurate models for predicting climate change?
- Q109.** What is meant by a simplified model in climate science?
- Q110.** Why can simplified climate models lead to misinformation in the media?
- Q111.** What is the role of peer review in climate science?
- Q112.** Why is it important for scientists to share their climate findings with a wide audience?
- Q113.** What are the benefits of using peer-reviewed sources when studying climate change?



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- Q114.** Explain how uncertainty in evidence can affect conclusions about climate change.
- Q115.** How can bias in media reports affect public understanding of climate change?
- Q116.** What is meant by the term “global climate change”?
- Q117.** What is the link between increased global temperatures and sea level rise?
- Q118.** How can climate change affect weather patterns?
- Q119.** Give one way that climate change might affect biodiversity.
- Q120.** Describe how changes in rainfall patterns due to climate change can affect agriculture.
- Q121.** Why are small island nations particularly at risk from global climate change?
- Q122.** What is the difference between climate change and weather?
- Q123.** How can climate change affect human health?
- Q124.** Why is it important to consider long-term data when studying climate change?
- Q125.** Give an example of a risk linked to global climate change.
- Q126.** Why might some people be more vulnerable to the effects of climate change?
- Q127.** Describe how climate change could affect global food production.
- Q128.** How could changes in temperature affect the spread of diseases?
- Q129.** Why do scientists study ice cores to learn about past climates?
- Q130.** What role do oceans play in regulating the Earth’s climate?
- Q131.** How does an increase in greenhouse gases lead to climate change?
- Q132.** Explain the greenhouse effect in terms of radiation from the sun and the Earth.
- Q133.** Why is carbon dioxide called a greenhouse gas?
- Q134.** Why is methane more powerful as a greenhouse gas than carbon dioxide?
- Q135.** What human activity is the biggest source of carbon dioxide emissions?
- Q136.** Describe one way to reduce methane emissions from landfill sites.
- Q137.** Why is it important to reduce greenhouse gas emissions?

- Q138.** Explain how rising global temperatures could affect natural ecosystems.
- Q139.** What is one potential economic impact of global climate change?
- Q140.** Why is international cooperation important in tackling climate change?
- Q141.** How can individuals reduce their carbon footprint?
- Q142.** What is meant by the term “carbon footprint”?
- Q143.** Explain how renewable energy can help reduce greenhouse gas emissions.
- Q144.** Describe one limitation of using biofuels to reduce carbon dioxide levels.
- Q145.** Why is reducing car use an effective way to lower CO₂ emissions?
- Q146.** How does climate change threaten polar habitats?
- Q147.** What is a potential social consequence of rising sea levels?
- Q148.** Describe one way that climate change might affect migration patterns.
- Q149.** Why do some scientists disagree on how quickly climate change will happen?
- Q150.** How can governments encourage people to reduce greenhouse gas emissions?
- Q151.** What is meant by the term ‘carbon footprint’?
- Q152.** Name two greenhouse gases that contribute to a product's carbon footprint.
- Q153.** Give two actions that can be taken to reduce carbon dioxide emissions.
- Q154.** How can individuals reduce their personal carbon footprint?
- Q155.** Suggest a reason why switching to renewable energy reduces carbon dioxide emissions.
- Q156.** Explain why reducing methane emissions from agriculture might be difficult.
- Q157.** Why might governments find it hard to reduce carbon emissions quickly?
- Q158.** Describe how improving home insulation can help reduce greenhouse gas emissions.
- Q159.** Give one reason why reducing the use of fossil fuels can be challenging for some countries.
- Q160.** How does reducing food waste help lower methane emissions?
- Q161.** What are the main elements found in most fossil fuels?

- Q162.** Name four gases that may be released when a fuel is burned.
- Q163.** What is the role of sulfur in the production of sulfur dioxide when fuels are burned?
- Q164.** What is formed when carbon in a fuel burns completely?
- Q165.** What are the main conditions needed to produce carbon monoxide during combustion?
- Q166.** What solid particles are formed from incomplete combustion of fuels?
- Q167.** How are oxides of nitrogen formed during combustion in car engines?
- Q168.** What is a common source of unburned hydrocarbons in the air?
- Q169.** Why is water vapour not considered a harmful pollutant from combustion?
- Q170.** How can you predict the products of combustion of a fuel if you know its composition?
- Q171.** What makes carbon monoxide especially dangerous to humans?
- Q172.** Why is carbon monoxide hard to detect without special equipment?
- Q173.** What happens to the body when carbon monoxide is inhaled?
- Q174.** Name one human health issue caused by inhaling soot or particulates.
- Q175.** What is global dimming and how is it linked to particulates?
- Q176.** How do sulfur dioxide and nitrogen oxides cause acid rain?
- Q177.** Give one effect of acid rain on buildings.
- Q178.** What impact does acid rain have on aquatic life?
- Q179.** How do oxides of nitrogen cause breathing difficulties?
- Q180.** Describe one way that sulfur dioxide affects human health.
- Q181.** How can industry reduce the amount of sulfur dioxide released into the air?
- Q182.** What device in cars helps reduce the emission of nitrogen oxides?
- Q183.** How does the use of catalytic converters reduce air pollution from vehicles?
- Q184.** Why is it better to burn natural gas than coal in terms of pollution?
- Q185.** Why are particulates harmful to people with asthma?



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- Q186.** Give one environmental impact of increased levels of particulates.
- Q187.** How can air pollution be reduced in cities?
- Q188.** Why do governments monitor air quality near busy roads?
- Q189.** Explain how burning fossil fuels contributes to poor air quality.
- Q190.** How do emissions from vehicles affect the environment?
- Q191.** What might be the long-term health effects of living in an area with high air pollution?
- Q192.** Why is it important to reduce emissions from power stations?
- Q193.** Give one reason why people oppose stricter pollution controls on factories.
- Q194.** What is meant by the term 'unburned hydrocarbons'?
- Q195.** How can improving fuel efficiency help reduce pollution?
- Q196.** Why is complete combustion preferred over incomplete combustion?
- Q197.** What is one problem caused by carbon monoxide inside homes?
- Q198.** Describe the link between air pollution and climate change.
- Q199.** Why are diesel engines sometimes more polluting than petrol engines?
- Q200.** How do indoor pollutants differ from outdoor pollutants in terms of health risks?