

Exercise walk-through

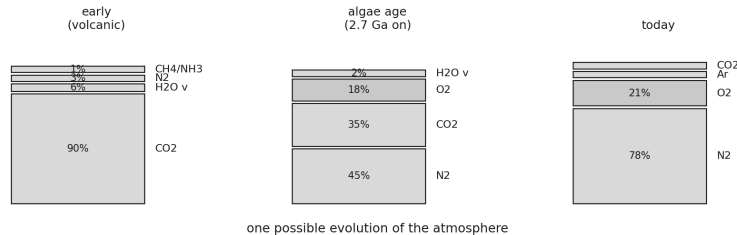
# 9.3

## Atmospheric pollutants and their sources (4.9.3.1–4.9.3.2)

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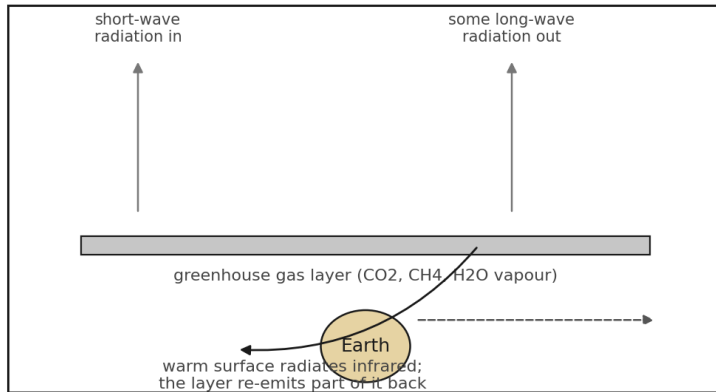
AQA · GCSE · Chemistry

# The evolving atmosphere



- Early — CO<sub>2</sub>, water vapour, nitrogen, methane; no oxygen.
- Oceans condensed; CO<sub>2</sub> dissolved into carbonate sediments.
- Photosynthesis — oxygen up, carbon buried as fossil fuels.

# The greenhouse effect



- CO<sub>2</sub>, methane, water vapour — the greenhouse gases.
- In — short-wave; out — long-wave infrared, partly trapped.
- Human causes — fossil fuels, deforestation, cattle, landfill.

## Exercises 2.1·2.3

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**2.1** Name the two products of complete hydrocarbon combustion. [2]

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**2.2** Which pollutant causes acid rain together with  $\text{NO}_x$ ? [1]

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**2.3** Why is carbon monoxide called a toxic gas? [1]

## 3 Exam-style questions

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## Exercises 2.1·2.3

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**2.1** Name the two products of complete hydrocarbon combustion. [2]

**2.1** Carbon dioxide and water.

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**2.2** Which pollutant causes acid rain together with  $\text{NO}_x$ ? [1]

**2.2** Sulfur dioxide.

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**2.3** Why is carbon monoxide called a toxic gas? [1]

## 3 Exam-style questions

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**2.3** It binds haemoglobin, reducing the blood's ability to transport oxygen.

## Exercises 3.1·3.3

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**3.1** Explain why incomplete combustion happens and give its two solid/gas products with one effect each. [5]

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**3.2** Describe how sulfur dioxide forms and how flue-gas desulfurisation reduces its release. [4]

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**3.3** Oxides of nitrogen form in engines even in clean fuel. Explain why, and give one environmental consequence and one remedy. [4]

## Exercises 3.1·3.3

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**3.1** Explain why incomplete combustion happens and give its two solid/gas products with one effect each. [5]

**3.1** Limited oxygen supply means the fuel cannot fully oxidise; carbon monoxide forms – toxic, binds haemoglobin; particulates/soot form – worsen breathing/respiratory problems and cause global dimming.

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**3.2** Describe how sulfur dioxide forms and how flue-gas desulfurisation reduces its release. [4]

**3.2** Fossil fuels contain sulfur impurities, which burn to sulfur dioxide; the flue gases pass through a neutralising spray/slurry – typically calcium oxide or calcium carbonate; which reacts with the  $\text{SO}_2$ , forming calcium sulfate, so less reaches the air.

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**3.3** Oxides of nitrogen form in engines even in clean fuel. Explain why, and give one environmental consequence and one remedy. [4]

**3.3** Engine temperatures are high enough for nitrogen and oxygen from the air to combine; forming  $\text{NO}$  and  $\text{NO}_2$ ; consequence – acid rain or photochemical smog; remedy – catalytic converters convert  $\text{NO}_x$  back to  $\text{N}_2$  and  $\text{O}_2$ .