

Exercise walk-through

10.3

Air quality and climate

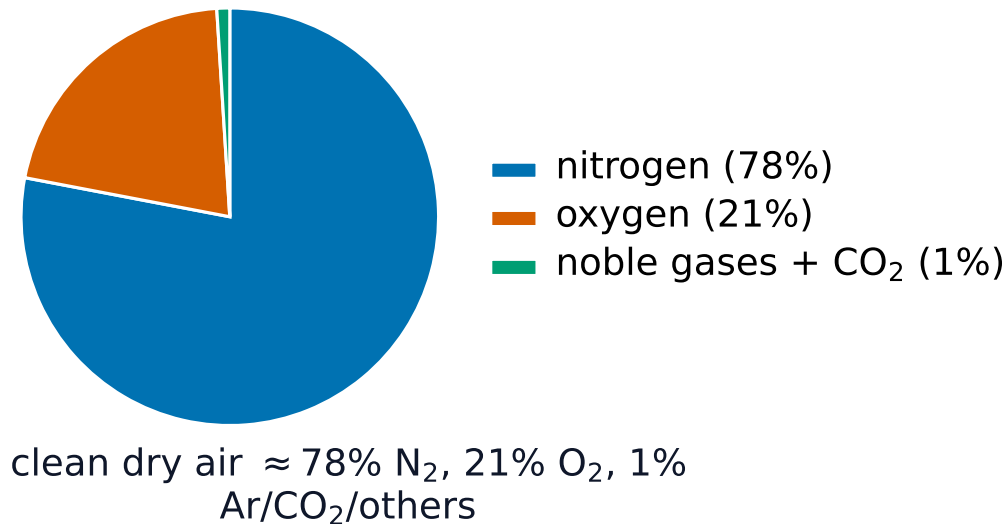
IGCSE Chemistry

The composition of air

Clean, dry air:

- 78% **nitrogen** (N_2)
- 21% **oxygen** (O_2)
- ~1% noble gases & CO_2

The composition of air, in detail



Clean, dry air is 78% **nitrogen** (N₂), 21% **oxygen** (O₂), and about 1% noble gases and CO₂.

Air pollutants and their sources

CO₂ – complete **combustion** of carbon fuels (a greenhouse gas)

CO & particulates – **incomplete combustion** of fuels

oxides of nitrogen – hot car engines

sulfur dioxide – burning fuels that contain **sulfur**

Effects of pollutants

CO₂ & **methane** : green-house → global warming

SO₂ & NO_x: **acid rain**

carbon monoxide: a toxic gas

particulates : breathing problems

The pollutants, their sources and their effects

methane

rotting plants, and waste gases from animal digestion – a strong greenhouse gas

carbon dioxide

burning **fossil fuels** – the main driver of climate change

sulfur dioxide

burning fuels containing sulfur – causes **acid rain**

oxides of nitrogen

formed in a hot car engine from the air's own nitrogen and oxygen

particulates

increase the risk of **respiratory** problems and **cancer**

carbon monoxide

toxic – it binds to haemoglobin in place of oxygen

A **catalytic converter** removes the oxides of nitrogen and carbon monoxide; **flue gas desulfurisation** removes sulfur dioxide at the power station.

Exercises 2.1·2.2

2.1 State the approximate percentages of nitrogen and oxygen in clean dry air. [2]

2.2 Name the gas that causes acid rain from burning sulfur-containing fuels. [1]

Exercises 2.1·2.2

2.1 State the approximate percentages of nitrogen and oxygen in clean dry air. [2]

2.1

- about **78% nitrogen**
 - about **21% oxygen**
-

2.2 Name the gas that causes acid rain from burning sulfur-containing fuels. [1]

2.2

- acid rain from sulfur fuels: **sulfur dioxide**

Exercise 3.1

3.1 Carbon monoxide is formed by:

[1]

☐

A complete combustion of a fuel

B incomplete combustion of a fuel

C photosynthesis

D respiration

Exercise 3.1

3.1 Carbon monoxide is formed by:

[1]

☐

A complete combustion of a fuel

B incomplete combustion of a fuel

C photosynthesis

D respiration

3.1 B

- carbon monoxide comes from **incomplete combustion**
- A is complete combustion; C and D produce CO_2

Exercise 3.2 (a)

3.2 Carbon dioxide and methane are greenhouse gases.

(a) Explain how greenhouse gases cause the Earth to warm up.

[3]

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3.2 Carbon dioxide and methane are greenhouse gases.

(a) Explain how greenhouse gases cause the Earth to warm up.

[3]

(a)

- greenhouse gases let **sunlight through** to warm the Earth
- they **absorb** the heat the Earth gives off
- and send some back down, so **less heat escapes**

Exercise 3.2 (b)

3.2 Carbon dioxide and methane are greenhouse gases.

(b) State one way to reduce the amount of carbon dioxide in the air.

[1]

Exercise 3.2 (b)

3.2 Carbon dioxide and methane are greenhouse gases.

(b) State one way to reduce the amount of carbon dioxide in the air.

[1]

(b)

- any **one** of: plant trees / burn fewer fossil fuels / use renewable energy

Exercise 3.3

3.3 A catalytic converter removes oxides of nitrogen and carbon monoxide. Give one benefit of fitting one to a car. [1]

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3.3 A catalytic converter removes oxides of nitrogen and carbon monoxide. Give one benefit of fitting one to a car. [1]

3.3

- it **reduces** NO_x and CO released, improving air quality