

10.3 Air quality and climate

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS oxides of nitrogen 氮氧化物 • acid rain 酸雨 • thermal energy 热能 • complete combustion 完全燃烧
• incomplete combustion 不完全燃烧

Objective

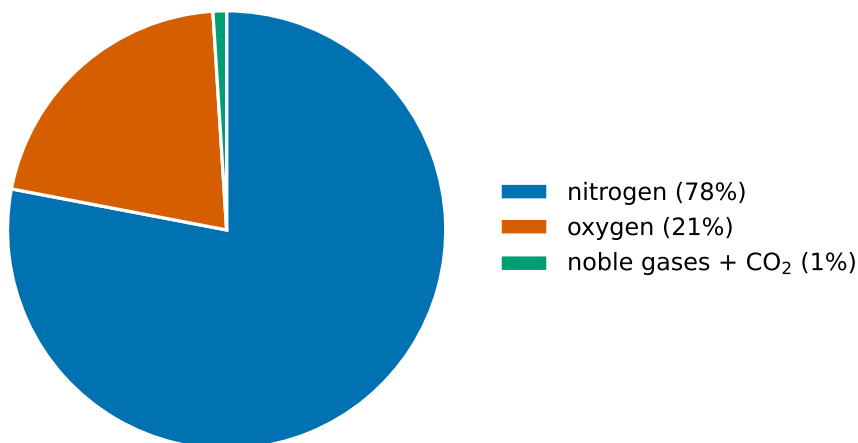
Build the skills to answer exam questions on **air quality and climate** 空气质量与气候 — air composition, **pollutants** 污染物 and their sources/effects, the **greenhouse effect** 温室效应, and ways to reduce pollution.

You must be able to:

- state the composition of clean dry air
- give the sources and effects of the common pollutants
- explain the greenhouse effect and pollution-reducing measures

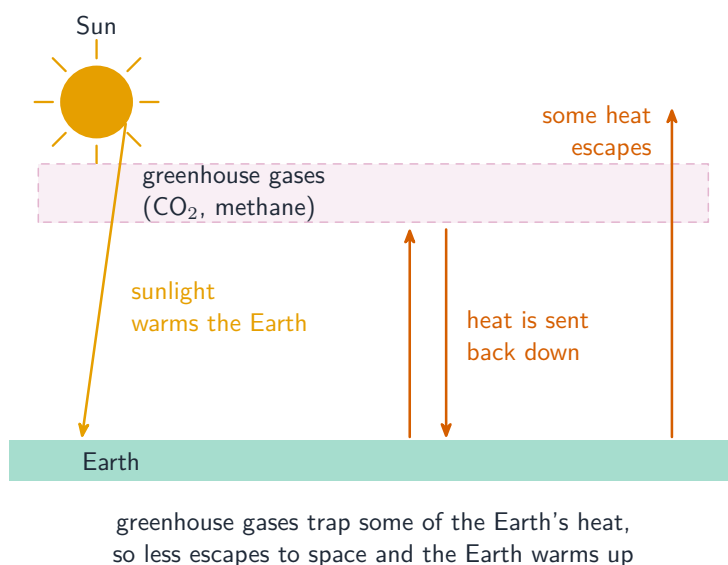
1 Worked examples

■ Air and the greenhouse effect



clean dry air $\approx$ 78% N₂, 21% O₂, 1% Ar/CO₂/others

Clean dry air $\approx$ 78% nitrogen, 21% oxygen, 1% other (noble gases + CO₂)



Greenhouse gases (CO₂, methane) absorb heat radiated by the Earth, warming it

- **pollutants:** CO (incomplete combustion, toxic); SO₂ (sulfur fuels, acid rain); NO_x (engines, acid rain).

2 Practice

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]

3 Exam-style questions

3.1 Carbon monoxide is formed by: [1]

- A complete combustion of a fuel
- B incomplete combustion of a fuel
- C photosynthesis
- D respiration

3.2 Carbon dioxide and methane are greenhouse gases.

(a) Explain how greenhouse gases cause the Earth to warm up. [3]

(b) State one way to reduce the amount of carbon dioxide in the air. [1]

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

Solutions

2.1 about 78% nitrogen; about 21% oxygen.

2.2 sulfur dioxide.

3.1 B. Carbon monoxide comes from incomplete combustion.

3.2 (a) greenhouse gases let sunlight through to warm the Earth; they absorb the heat (thermal energy) the Earth gives off; and send some back down, so less heat escapes and the Earth warms.

(b) plant trees / burn fewer fossil fuels / use renewable energy.

3.3 it reduces the harmful gases (NO_x and CO) released, improving air quality.