

7.7 Acid Rain

Name: _____ Class: _____ Date: _____

Total: 11 marks**KEY WORDS** acid rain 酸雨 • scrubbers 洗涤器 • catalytic converters 催化转化器 • ozone 臭氧

Objective

Build the skills to answer exam questions on **acid rain**.**You must be able to:**

- explain how **acid rain** 酸雨 forms from SO_2 and NO_x
- describe effects on water, soil, forests, and buildings
- suggest solutions

1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

■ How acid rain forms

Burning fossil fuels releases SO_2 and NO_x , which react with water in the atmosphere to form **sulfuric** and **nitric acids**. These fall as **acid rain** (pH below normal ~5.6).

■ Effects

- **Lakes/streams** become acidic, killing fish and aquatic life.
- **Soil** loses nutrients and releases toxic aluminum.
- **Forests** are damaged (leaf/needle loss).
- **Buildings/statues** (limestone, marble) are eroded.

■ It travels

Acid rain often falls **far from** the source (carried by wind), so pollution in one country can harm another — a transboundary problem.

■ Solutions

Reduce SO_2/NO_x using **scrubbers**, low-sulfur fuels, and catalytic converters; adding **lime** can temporarily neutralize acidified lakes.

2 Practice

Now apply the methods above.

2.1 Which two pollutants cause acid rain? [2]

2.2 State one effect of acid rain on aquatic life. [1]

2.3 State one way to reduce acid rain. [1]

3 Exam-style questions

3.1 Acid rain forms when SO_2 and NO_x react in the atmosphere with [1]

- **A** oxygen only
- **B** water to form acids
- **C** nitrogen gas
- **D** ozone

3.2 A coal-burning region downwind has acidified lakes.

(a) Explain how the coal plants cause the acidified lakes. [3]

(b) State one solution to reduce the emissions. [1]

3.3 Explain why acid rain is considered a transboundary (cross-border) problem. [2]

Solutions

2.1 SO_2 and NO_x .

2.2 It acidifies the water, killing fish/aquatic life.

2.3 Any one: scrubbers, low-sulfur fuel, catalytic converters, less fossil-fuel use.

3.1 B — water to form acids.

3.2 (a) The plants emit SO_2 and NO_x ; these react with water in the air to form sulfuric and nitric acids; the acid rain falls into the lakes and acidifies them. (b) Any one: scrubbers, low-sulfur fuel, reduce coal use.

3.3 The pollutants are carried by wind and fall as acid rain far from where they were emitted, so one country's emissions can damage another's ecosystems.