

2.6 Evaluate environmental chemistry benefits and remaining effects

Name: _____ Class: _____ Date: _____

Total: 24 marks

KEY WORDS pollution 污染 • combustion 燃烧 • greenhouse effect 温室效应

Objective

Evaluate environmental chemistry benefits and remaining effects. This is original GAC023-aligned practice, not an official assessment. All supplied case data and review records are fictional; explicitly cited background is factual. The case data are invented for learning; they are not findings about a real school, country or population. Use the supplied evidence and do not invent missing observations.

1 Key knowledge and worked examples

■ Key knowledge: a treatment result needs a mass balance, a stated criterion and waste handling

Pollution 污染 involves substances or other agents causing harmful environmental effects; the amount, pathway and conditions matter. **Combustion** 燃烧 of carbon-containing fuels can release carbon dioxide. Carbon dioxide absorbs and emits thermal infrared radiation and contributes to the **greenhouse effect** 温室效应. Acid deposition involves sulfur dioxide and nitrogen oxides reacting in the atmosphere to form acidic compounds; this is a different mechanism. Chemistry can also support treatment, but removal from water does not necessarily destroy a substance.

■ Source A: text or task brief

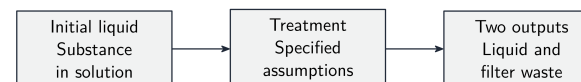
Scientific background checked 2 October 2026: EPA explanation of acid-rain formation describes atmospheric reactions involving sulfur dioxide and nitrogen oxides. NASA radiation budget explains infrared absorption by greenhouse gases. These sources do not measure the fictional classroom treatment below.

Supplied fictional treatment record: a 10.0 L liquid sample contains a model substance at 12.0 mg/L before treatment and 3.0 mg/L after treatment. Assume volume stays 10.0 L and the only substance removed from the liquid is retained on the filter. For this written exercise, the declared target is at most 2.0 mg/L. This is an invented task target, not a real environmental or drinking-water standard. Students analyse the record; they do not handle or discharge chemicals.

■ Source B: response or review record

Report draft: “The filter destroyed all the substance, leaving pure water. A seventy-five-percent reduction means the two-milligram-per-litre target is met. Filter waste can be ignored because it is no longer in the liquid. Reducing a model substance proves every environmental effect has disappeared. Carbon dioxide causes acid rain in exactly the same way as sulfur dioxide, so one chemical intervention solves both problems.”

■ Worked example: follow the substance through the stated treatment boundary



Known: initial concentration 12.0 mg/L and volume 10.0 L. Why multiply? Concentration is mass per volume.

$$m = CV$$

$$m_{\text{initial}} = 12.0 \frac{\text{mg}}{\text{L}} \times 10.0 \text{ L} = 120 \text{ mg}$$

Under the supplied assumptions, lower concentration means less substance in the liquid, not proof of destruction. Account for filter waste and compare the final concentration with the actual task target.

2 Practice

2.1 State ONE difference between the supplied acid-rain and greenhouse mechanisms.[2]

2.2 Calculate the substance mass remaining in the liquid. [2]

2.3 Calculate the mass retained on the filter and the percentage reduction in liquid concentration. [3]

2.4 Explain why the target is not met and why the waste still matters. [3]

3 Exam-style questions

3.1 Evaluate the report’s claims about destruction and complete environmental success using six points. [6]

3.2 Write an 80–110-word treatment conclusion that retains the calculation and scope limits. [8]
