

1.6 The Phosphorus Cycle

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS phosphorus cycle 磷循环 • limiting nutrient 限制性营养 • carbon cycle 碳循环
• food chain 食物链

Objective

Build the skills to answer exam questions on the **phosphorus cycle**.

You must be able to:

- explain that the phosphorus cycle has **no atmospheric (gas) stage**
- describe it as slow (rock → soil → organisms → sediment)
- explain why phosphorus is often the **limiting nutrient** 限制性营养

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.

■ No gas phase

Unlike carbon and nitrogen, the **phosphorus cycle has no atmospheric stage** — phosphorus does not form a common gas. It moves through **rock, soil, water, and organisms** only.

■ A slow cycle

Phosphorus is released slowly by **weathering** of rock into soil, taken up by plants, passed through food chains, and returned to soil/sediment by decomposition. It is a **slow cycle**.

■ The limiting nutrient

Because usable phosphorus is scarce and released slowly, it is often the **limiting nutrient** — the one in shortest supply that limits growth.

■ Human disturbance

Adding phosphorus (fertilizer, detergents) to water can trigger **algal blooms** and **eutrophication**, because the normally-limiting nutrient is suddenly abundant.

2 Practice

Now apply the methods above.

2.1 What stage does the phosphorus cycle lack (unlike carbon and nitrogen)? [1]

2.2 How is phosphorus released from rock? [1]

2.3 Why is phosphorus often the limiting nutrient? [1]

3 Exam-style questions

3.1 The phosphorus cycle differs from the carbon cycle because it has no [1]

A	B
C	D

A rock reservoir

B atmospheric (gas) stage

C role in organisms

D water movement

3.2 Phosphate detergents enter a lake.

(a) Explain why this can cause an algal bloom. [2]

(b) State why phosphorus normally limits growth. [1]

3.3 Explain why the phosphorus cycle is slower than the carbon cycle. [2]