

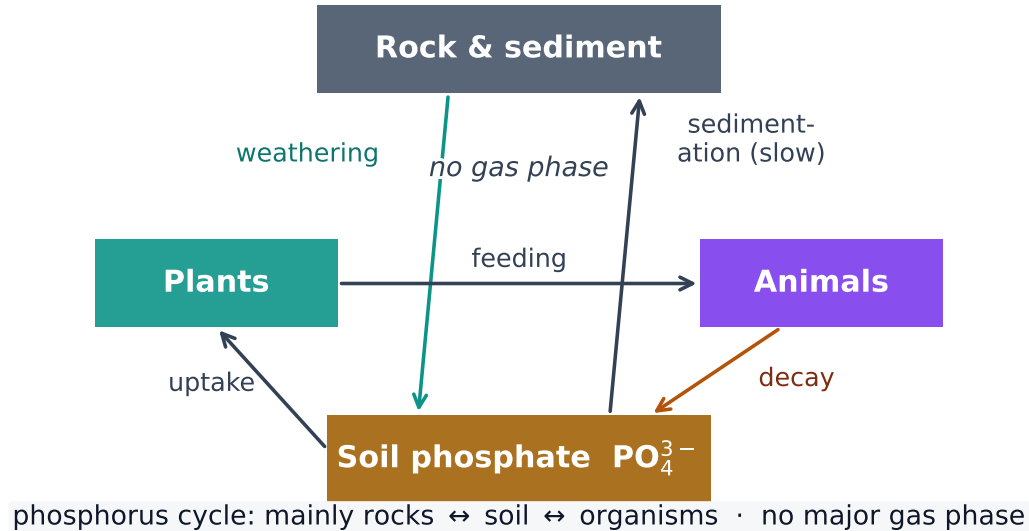
Exercise walk-through

1.6

The Phosphorus Cycle

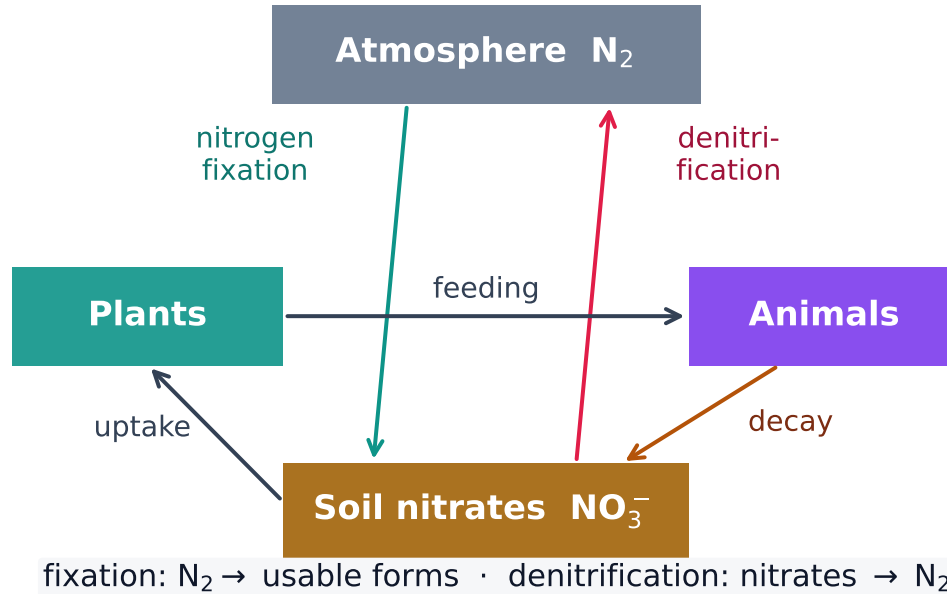
AP Environmental Science

The Phosphorus Cycle



The phosphorus cycle: rock weathers to soil phosphate and slowly sediments back, with no gas phase

Nitrogen and phosphorus, in detail



Nitrogen cycles through the **air**, phosphorus only through **rock** and water. An excess of either causes **eutrophication**.

Exam tips

- Remember **energy flows and is lost** (the 10% rule) while **matter cycles** (carbon, nitrogen, phosphorus, water).
- Apply the 10% rule down a food chain and know **$\text{NPP} = \text{GPP} - \text{respiration}$** (only NPP is available to consumers).
- Learn each biogeochemical cycle's stores and how humans disturb it (burning fossil fuels adds CO_2 ; fertiliser adds nitrogen/phosphorus).
- Producers are most abundant because so little energy reaches the top.
- Use correct units and show your arithmetic on the free-response math questions (no calculator – keep numbers round).

Exercises 2.1-2.3

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]

Exercises 2.1-2.3

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

2.1

- An atmospheric (gas) stage
-

2.2 How is phosphorus released from rock? [1]

2.2

- By weathering of rock
-

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

2.3

- It is scarce and released slowly, so it runs out first and limits growth

Exercise 3.1

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

[1]

☐

A rock reservoir

B atmospheric (gas) stage

C role in organisms

D water movement

Exercise 3.1

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

☐

A rock reservoir

B atmospheric (gas) stage

C role in organisms

D water movement

3.1 B

- an atmospheric (gas) stage

Exercise 3.2 (a)

3.2 Phosphate detergents enter a lake.

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

[2]

Exercise 3.2 (a)

3.2 Phosphate detergents enter a lake.

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

[2]

(a)

- Phosphorus is normally limiting; adding it lets algae grow rapidly (a bloom), which then decomposes and depletes oxygen

Exercise 3.2 (b)

3.2 Phosphate detergents enter a lake.

(b) State why phosphorus normally limits growth.

[1]

Exercise 3.2 (b)

3.2 Phosphate detergents enter a lake.

(b) State why phosphorus normally limits growth.

[1]

(b)

- It is the nutrient in shortest supply, so growth stops when it runs out

Exercise 3.3

3.3 Explain why the phosphorus cycle is slower than the carbon cycle.

[2]

Exercise 3.3

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

3.3

- It has no fast atmospheric stage and relies on the slow weathering of rock, so phosphorus moves through the environment much more slowly than carbon