

Exercise walk-through

8.8

Bioaccumulation and Biomagnification

AP Environmental Science

Persistent toxins

POPs

resist breakdown

decades and travel far.

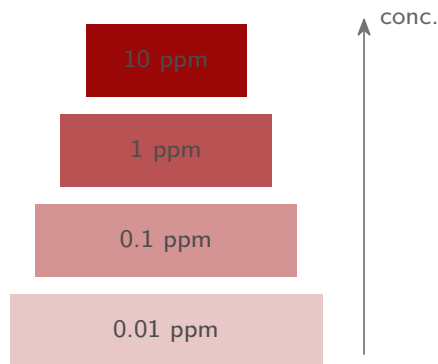
(DDT, PCBs)

, so they last

- **bioaccumulation** : builds up in one body

- **biomagnification** : rises up the food chain

Top predators (and people who eat them) carry the highest **mercury** dose.



Pollutants that do not go away

Persistent organic pollutants

Persistent organic pollutants resist breakdown, dissolve in fat and so bioaccumulate – DDT, PCBs, dioxins.

Biomagnification

Each trophic level concentrates what it eats, so top predators carry the highest burden.

Algal blooms

Algal blooms follow nutrient runoff; when the algae die, decomposition strips the oxygen and the fish suffocate.

Disease and water

Contaminated water spreads cholera and dysentery; crowding spreads **tuberculosis (TB)** – both are pollution problems as much as medical ones.

Persistence, solubility in fat, and trophic position. Those three predict where a toxin ends up.

Exam tips

- Trace **eutrophication** step by step: nutrient runoff → algal bloom → decay → oxygen depletion → fish die.
- **Bioaccumulation** builds up in one organism; **biomagnification** increases up the food chain, so top predators are hit hardest.
- Read an **LD50**: a **lower** value means **more** toxic; multiply by body mass for a lethal dose.
- Order the waste hierarchy **reduce** > **reuse** > **recycle**, and the stages of sewage treatment.
- Link pathogens to contaminated water and to clean-water/sanitation defences.

Exercises 2.1-2.3

2.1 Define bioaccumulation.

[1]

2.2 Define biomagnification.

[1]

2.3 Which organisms have the highest toxin levels?

[1]

Exercises 2.1-2.3

2.1 Define bioaccumulation.

[1]

2.1

- Build-up of a toxin within one organism over its life
-

2.2 Define biomagnification.

[1]

2.2

- Increase in a toxin's concentration up the food chain
-

2.3 Which organisms have the highest toxin levels?

[1]

2.3

- Top predators

Exercise 3.1

3.1 Biomagnification describes toxins that

[1]

☐

A decrease up the food chain

B increase in concentration up the food chain

C stay constant

D disappear

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3.1 B

- increase in concentration up the food chain

Exercise 3.2 (a)

3.2 Mercury is released into a lake.

(a) Explain how it becomes concentrated in large fish.

[3]

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3.2 Mercury is released into a lake.

(a) Explain how it becomes concentrated in large fish. [3]

(a)

- Mercury is taken up by plankton and accumulates; small fish eat many plankton, big fish eat many small fish, so it concentrates (biomagnifies) at each level, reaching high levels in large fish

Exercise 3.2 (b)

3.2 Mercury is released into a lake.

(b) State why humans are advised to limit eating large predatory fish.

[1]

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(b) State why humans are advised to limit eating large predatory fish. [1]

(b)

- Large predatory fish have the highest mercury levels, which are harmful to health

Exercise 3.3

3.3 Explain why a toxin must be persistent to biomagnify.

[2]

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3.3 Explain why a toxin must be persistent to biomagnify.

[2]

3.3

- If the toxin broke down quickly it would not persist long enough to accumulate and pass up the chain; persistence lets it build up at each level