

Exercise walk-through

8.13

Dose Response Curve

AP Environmental Science

Persistent toxins

POPs

resist breakdown

decades and travel far.

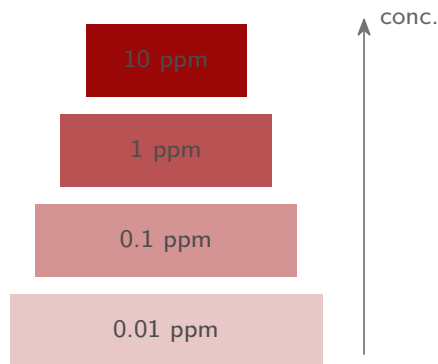
(DDT, PCBs)

, 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.



Worked example – reading a BOD result

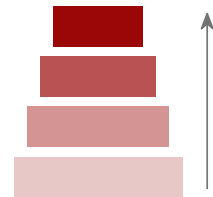
A river below a sewage outfall has high BOD and almost no fish. Explain the link.

- BOD = the oxygen **decomposer bacteria** use to break down organic waste.
- Sewage feeds the bacteria $\Rightarrow$ they multiply and **respire hard**.
- Dissolved oxygen **crashes** $\Rightarrow$ fish suffocate and only tolerant species survive.
- Further downstream the waste runs out $\Rightarrow$ oxygen recovers $\Rightarrow$ **a classic oxygen sag curve**.

High BOD = dirty water: it means a big oxygen demand, not a lot of oxygen. Fish die of **suffocation**, not poisoning.

Check yourself

- 1 Is farm run-off a point or nonpoint source?
- 2 What uses up the oxygen in a eutrophic dead zone?
- 3 Who carries the highest biomagnified toxin dose?
- 4 Does a lower LD_{50} mean more or less toxic?



Answers 1. nonpoint 2. bacteria decomposing dead algae 3. top predators 4. more toxic

Exercises 2.1-2.3

2.1 What does a dose-response curve plot? [1]

2.2 What is a threshold dose? [1]

2.3 What is assumed about a no-threshold agent? [1]

Exercises 2.1-2.3

2.1 What does a dose-response curve plot? [1]

2.1

- The effect (response) against the dose
-

2.2 What is a threshold dose? [1]

2.2

- A dose below which there is no observable effect
-

2.3 What is assumed about a no-threshold agent? [1]

2.3

- Any dose carries some risk (no safe level)

Exercise 3.1

3.1 A substance with a threshold dose has

[1]

☐

A an effect at any dose

B no effect below a certain dose

C the same effect at all doses

D no effect ever

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3.1 B

- no effect below a certain dose

Exercise 3.2 (a)

3.2 A dose-response curve is flat up to a dose of 20 mg, then rises.

(a) State the threshold dose.

[1]

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[1]

(a)

- 20 mg

Exercise 3.2 (b)

3.2 A dose-response curve is flat up to a dose of 20 mg, then rises.

(b) Explain what happens below and above it.

[2]

Exercise 3.2 (b)

3.2 A dose-response curve is flat up to a dose of 20 mg, then rises.

(b) Explain what happens below and above it.

[2]

(b)

- Below 20 mg there is no observable effect; above it, the response increases with dose

Exercise 3.3

3.3 Explain why some carcinogens are treated as having no safe threshold. [2]

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3.3

- Even a single exposure could damage DNA and start a cancer, so any dose is assumed to carry some risk – there is no dose considered completely safe