

8.8 Bioaccumulation and Biomagnification

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

KEY WORDS biomagnification 生物放大 • bioaccumulation 生物累积

Objective

Build the skills to answer exam questions on **bioaccumulation and biomagnification**.

You must be able to:

- distinguish **bioaccumulation** 生物累积 from **biomagnification** 生物放大
- explain why top predators have the highest levels
- give examples (mercury, DDT)

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.

■ Bioaccumulation

Bioaccumulation is the build-up of a persistent toxin **within one organism** over its lifetime, because it is taken in faster than it is removed (stored in fat).

■ Biomagnification

Biomagnification is the **increase in concentration up the food chain**. Each predator eats many contaminated prey, so the toxin concentrates at each higher trophic level.

■ Top predators worst affected

Because levels multiply at each step, **top predators** (and humans) end up with the **highest** concentrations — sometimes millions of times the water level.

■ A worked example

Mercury enters water, is taken up by plankton (bioaccumulation), then concentrates through small fish → big fish → humans (biomagnification), which is why large predatory fish (tuna, shark) carry high mercury.

2 Practice

Now apply the methods above.

2.1 Define bioaccumulation. [1]

2.2 Define biomagnification. [1]

2.3 Which organisms have the highest toxin levels? [1]

3 Exam-style questions

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

3.2 Mercury is released into a lake.

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

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

3.3 Explain why a toxin must be persistent to biomagnify. [2]

Solutions

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

2.2 Increase in a toxin's concentration up the food chain.

2.3 Top predators.

3.1 B — increase in concentration up the food chain.

3.2 (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. (b) Large predatory fish have the highest mercury levels, which are harmful to health.

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.