AP ENVIRONMENTAL SCIENCE • EXERCISE SHEET

8.12 Lethal Dose 50% (LD50)

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

KEY WORDS ld50 半数致死量

Objective

Build the skills to answer exam questions on **LD50** (lethal dose 50%).

You must be able to:

- define **LD50** 半数致死量
- interpret LD50 values (lower = more toxic)
- compare the toxicity of substances

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.

What LD50 is

LD50 is the **dose that kills 50%** of a test population, usually given in mg of substance per kg of body weight (**mg/kg**). It measures a chemical's **acute toxicity**.

Lower LD50 = more toxic

A **lower** LD50 means **less** substance is needed to be lethal, so it is **more toxic**. A **higher** LD50 means it takes more, so it is **less toxic**.

A worked comparison

Substance A has LD50 = 5 mg/kg; substance B has LD50 = 500 mg/kg. **A is more toxic** — far less is needed to kill.

Dose for a person

To estimate a lethal dose for a 70 kg person from LD50 = 5 mg/kg: $5 \times 70 = 350$ mg (rough guide from animal data).

2 Practice

Now apply the methods above.

2.1 Define LD50. [1]

2.2 Does a lower or higher LD50 mean more toxic? [1]

2.3 Substance X (LD50 = 2 mg/kg) vs Y (LD50 = 200 mg/kg): which is more toxic? [1]

3 Exam-style questions

3.1 A chemical with a very low LD50 is [1]

- **A** very toxic
- **B** not toxic
- **C** a nutrient
- **D** harmless

3.2 Two pesticides have LD50 values of 10 mg/kg and 1000 mg/kg.

(a) State which is more toxic, with a reason. [2]

(b) Estimate the lethal dose for a 60 kg person from the 10 mg/kg value. [2]

3.3 Explain why LD50 is measured in mg per kg of body weight rather than just mg. [2]

Solutions

2.1 The dose that kills 50% of a test population.

2.2 Lower.

2.3 X (LD50 = 2 mg/kg).

3.1 A — very toxic.

3.2 (a) The 10 mg/kg pesticide — a lower LD50 means less is needed to be lethal, so it is more toxic. (b) $10 \times 60 = 600$ mg.

3.3 A larger animal needs more of a substance to be affected, so expressing the dose per kg of body weight makes toxicity comparable across different body sizes.