Unit 29 · Environmental Pollution

ANSWER KEY · FOR TEACHERS

Full marks 35

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. secondary
2. non-biodegradable
3. carboxyhemoglobin
4. effluent
5. BOD
6. eutrophication
7. biomagnification
8. management

K · 4

Each carries 0.5 mark.

2 Label the diagram

1. drops catch the dust
2. earthed plate, dusty
3. charged wires (high voltage)
4. dust into the hopper
5. water in
6. dirty water out

K · 3

Each carries 0.5 mark.

3 Multiple choice

i. **c.** SO_2 and NO_2 — K · 1

Sulphur dioxide and **nitrogen dioxide** form sulphuric and nitric acids in the air.

ii. **d.** biochemical oxygen demand — K · 1

Biochemical oxygen demand: the oxygen microorganisms use up in breaking down organic matter. Some books expand it as **biological** oxygen demand, which means the same thing; either is accepted.

iii. **b.** secondary — U · 1

It forms in the air when oxides of nitrogen and hydrocarbons from exhausts react in sunlight: a **secondary** pollutant.

iv. **b.** It joins hemoglobin far more firmly than oxygen, so the blood carries less oxygen, and it can't be seen or smelled. — U · 1

Carbon monoxide forms **carboxyhemoglobin**, taking oxygen's place in the blood, and with no color or smell nobody notices it building up in a closed room.

v. **c.** eutrophication occurs — A · 1

The nutrients cause **eutrophication**: algae bloom, then decay and use up the oxygen. (Fish and other animals do decrease as a result, but those are its effects; the process itself is called eutrophication.)

4 Very short answers

a. MARKING SCHEME — K · 1

✓ Minamata disease.

b. MARKING SCHEME — K · 1

✓ Reduce, reuse, recycle.

c. MARKING SCHEME — U · 1

✓ Warm water holds less oxygen.

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5 Short answers

a. MARKING SCHEME U · 2

- ✓ Primary: released as they are, e.g. SO_2.
- ✓ Secondary: formed in the environment by reactions, e.g. ground-level ozone.

b. MARKING SCHEME A · 2

- ✓ Decomposers multiply on the organic matter of the sewage (high BOD).
- ✓ They use up the dissolved oxygen, so fishes suffocate.

c. MARKING SCHEME U · 2

- ✓ A few pests already have genes that let them survive.
- ✓ They survive spraying, breed and pass them on, so resistant pests increase.

d. MARKING SCHEME U · 3

- ✓ Any one source.
- ✓ Any second and third sources.
- ✓ One control measure.

6 Long answers

a. ANSWER U · 4

a. Treat sewage in treatment plants before letting it into rivers; make compost or biogas from organic waste.
b. Make industries treat their effluents, removing poisons and heavy metals, and cool hot water before releasing it.
c. Use agrochemicals only as much as needed, and follow IPM, biofertilizers and manure.
d. Recycle wastes and never dump them in or beside rivers.
e. Plant trees along rivers to hold the banks and filter runoff.
f. Raise public awareness, control population growth, and enforce environmental protection laws strictly.

MARKING SCHEME

- ✓ Treat sewage before it reaches rivers; compost or biogas from organic waste.
- ✓ Industries treat their effluents and cool hot water before release.
- ✓ Agrochemicals only as needed; IPM, biofertilizers and manure.
- ✓ Any one more: recycling, trees along rivers, awareness, laws.

b. ANSWER U · 4

a. Keep engines tuned and test vehicles' emissions regularly; take old, smoky vehicles off the road.
b. Use cleaner fuel: unleaded petrol, low-sulphur diesel.
c. Fit **catalytic converters**, which turn CO, hydrocarbons and oxides of nitrogen into CO_2, water and nitrogen.
d. Use **electric vehicles**, which have no exhaust; in Nepal they run on hydroelectricity.
e. Use public transport, cycles and walking; share rides.
f. Plan traffic and keep roads in good repair, so vehicles don't idle in jams or raise dust.

MARKING SCHEME

- ✓ Tuned engines, emission tests, old smoky vehicles off the road.
- ✓ Cleaner fuel: unleaded petrol, low-sulphur diesel.
- ✓ Catalytic converters turning CO, hydrocarbons and NO_x into CO_2, water and nitrogen.
- ✓ Electric vehicles, public transport, cycling and walking, or better traffic planning.

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7 Think

ANSWER HA · 3

DDT dissolves in **fat**, not water, and is **not broken down**, so an animal doesn't pass it out in its urine but stores it in its body fat and keeps nearly all it takes in. Each animal eats **many** of the ones below it in the food chain, so the DDT of all of them is gathered in it: plankton, then small fish, then big fish, then birds, many times more at each step (**biomagnification**). A pollutant that dissolves in water is washed out in urine and doesn't build up.

MARKING SCHEME

- ✓ DDT dissolves in fat and is non-biodegradable, so it is stored, not excreted.
- ✓ Each animal eats many of those below, gathering their DDT.
- ✓ So it grows at each step of the food chain: biomagnification.

8 Activity: Pollution near you (Project work)

(not marked)

WHAT STUDENTS SHOULD FIND

For example: black smoke from an old truck, air, burning diesel, lungs and visibility; dark, smelly river water, water, sewage and effluents, fish (low oxygen) and people downstream (disease); plastic heaped by the road, soil, households, roots and drains (floods); burning rubbish, air, households, lungs. Actions: separate waste and compost the kitchen part; stop burning rubbish; plant trees along the river; ask the municipality for a treatment plant or emission tests.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	11	18	3	3	**35**

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