

Science 9 - Unit C - Review Booklet

Learning Outcomes

Can you?

- describe processes by which chemicals are introduced into the environment
- identify acids, bases, and neutral substances based on measurement of their pH
- describe the effects of acids and bases
- identify common organic and inorganic substances that are essential to living things
- describe organic matter synthesized by organisms
- describe the uptake of materials by living things
- identify substrates and nutrient sources for living things in a variety of environments
- identify questions about the safe release of substances into the environment
- describe and illustrate the use of biological monitoring as a method of determining environmental quality
- identify chemical factors in the environment that might affect the health and distribution of living things
- apply and interpret measures of chemical concentration in parts per million, billion, or trillion
- describe the transport of materials through air, soil, and water
- identify factors that may accelerate or retard the distribution of chemicals
- describe how the concentration of substances can be changed in the environment
- describe ways that biodegradation occurs and interpret information about the biodegradability of materials
- demonstrate how hazardous chemicals can affect the local and global environments
- identify potential risks resulting from consumer practices
- evaluate information and evidence related to an environmental issue

Unit at a Glance

- Nutrients are compounds or elements that are essential for production of the organic matter that makes up living organisms.
- Organic nutrients are carbon-based compounds such as carbohydrates, proteins, lipids, and vitamins, which are produced by green plants and modified by animals.
- Inorganic nutrients — the minerals — are divided into macrominerals and trace elements, depending on how much is needed for normal health.
- Minerals are essential components of enzymes and vitamins, the molecules that help regulate the chemical reactions in living organisms.
- Artificial fertilizers greatly increase the amount and types of plant crops that can be grown for human consumption, but also require large amounts of fresh water.
- Agriculture influences the environment by effectively decreasing biodiversity.
- The use of chemical poisons and toxins to control pests is widespread and although they are effective in reducing disease-causing organisms, they should be carefully controlled and regulated.
- Fossil fuel combustion results in the emission of nitrogen, sulfur, and carbon oxides that react with moisture in the atmosphere to form acid compounds.
- Acid precipitation results in the leaching of minerals from soils, and damage to living organisms.
- Acid-base neutralization reactions between minerals, such as limestone (calcium carbonate) and acidified waters in lakes and streams, can lead to more neutral pH water.
- The amount or dose of a pollutant that will cause harm is established by observing the effects of the pollutant on living organisms.
- Toxicity is usually expressed in parts per million (ppm) or parts per billion (ppb).
- Since different organisms respond to toxic chemicals in different ways, toxicity is commonly measured by the LD50 — the dose needed to kill 50 percent of the population that it is applied to.
- The monitoring of the levels of pollutants in any ecosystem requires knowledge of how to detect those pollutants or their effects, either by chemical testing or direct observation of biological organisms.
- Biological indicators are organisms whose presence or absence gives clues as to the amount of pollution affecting any ecosystem.
- The dispersal of atmospheric pollutants is affected by global wind patterns. Pollutants may be carried great distances before their effects are felt.
- Biodegradable wastes are those wastes that can be broken down by the action of living organisms. The rate of biodegradability is determined by the chemical structure of the waste material.
- Bioremediation is the use of living organisms, such as plants and bacteria, to control or remove the presence of pollutants from the general environment.

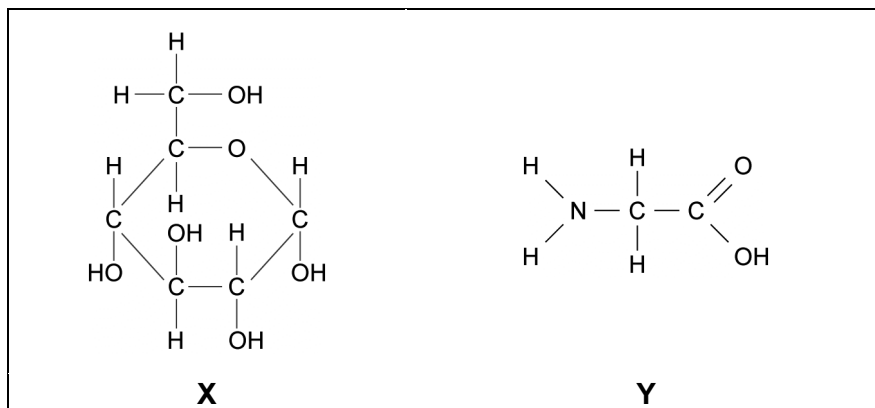
Unit C: Environmental Chemistry

Science 9 Review

Wherever necessary, answer questions on a separate sheet of paper.

1. Why are nitrogen-fixing bacteria important in the nitrogen cycle?
2. Imagine that a tanker truck has spilled a strong base. Explain how this spill can be cleaned up.

Use the following information to answer question 3.



3. a) State the name of the organic molecule that contains many units of “X.”
b) State the name of the organic molecule that contains many units of “Y.”
4. In an experiment conducted to show the effect of pH on the rate of hydrolysis of starch, identify the manipulated and responding variables.

5. Why are sulfur dioxide and nitrogen oxides major air pollutants?

6. Predict two effects of global warming.

7. What is the concentration in ppm of sulfur in a water supply if there are 0.002 mL of sulfur in each litre of solution?

Use the following information to answer question 8.

Your community council proposed several ways to clean up an organic spill in a park.

Proposal 1: using bacteria to break up organic substances

Proposal 2: using green plants to remove pollutants from the soil

Proposal 3: using sunlight to break down organic compounds.

8. Match the number of the proposal to the term that it defines.
Use **each number only once**.

photolysis

biodegradation

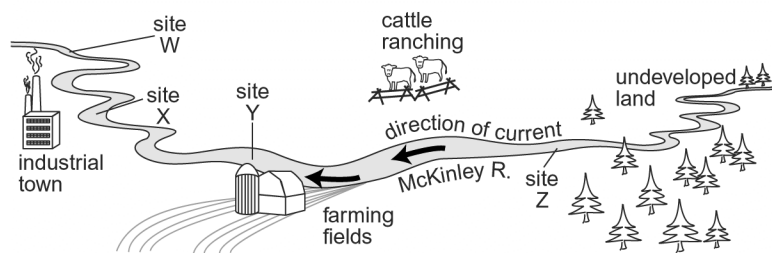
phytoremediation

9. How were the local people affected by the *Exxon Valdez* oil spill?

- 10.** What do product labels indicate that helps people use the products safely?
- 11.** Why should hazardous household waste not be poured down a drain?
- 12.** Explain why most nutrients are required in “optimum amounts.”
- 13.** Describe two ways that lichens and red snow algae are similar.
- 14.** If the soil is magnesium deficient, predict two ways that that a plant will be affected. (Hint: Magnesium is found in the chemical make-up of chlorophyll.)
- 15.** If 0.45 mL of food colouring are placed in 2 L of water, what is the concentration in ppm?

16. If the plants used in phytoremediation are not harvested, how might they affect the food chain in which they are located?
17. Describe two ways that oil spills affect living things.
18. Mercury-contaminated fish have been a problem in parts of Canada. Identify the possible sources of the mercury, the method of transport, and the way it accumulates in fish.
19. Describe two ways of controlling mosquito populations.

Use the following information to answer question 20.



Map of a portion of the McKinley River. Biological water sampling was done at sites W, X, Y, and Z.

20. What site will probably have the greatest diversity of organisms? Give a reason for your answer.