

5.4

Chemical Changes in the Environment

Changes are constantly occurring in the environment. Matter may become part of the atmosphere, sit in a landfill, be washed away to an ocean, or be buried underground. However, matter is never completely gone. It remains on Earth. Matter can turn into something else and be used again and again because of chemical changes. One change is followed by another and another.

Chemical Changes in the Living Environment

There are many examples of chemical changes in the living environment. One of the most spectacular examples is a forest fire. A forest fire is not only the end of a forest; it is also the beginning of a new forest (Figure 1). In a forest fire, huge trees seem to disappear in minutes. They have not actually disappeared, however. The materials in the trees have been changed into other materials. The leaves and trunks have become gases and smoke in the air, and ashes on the ground. How do you think these new materials can be used as new growth begins?



Figure 1

Whole forests can be consumed by fire, which is a chemical reaction. Chemical reactions are also involved in the gradual regrowth of the forest.

Not all chemical changes are as spectacular as burning. Many are so slow that you cannot see them happening. For example, the new growth in a burned-over area is the result of many chemical changes that go on inside living organisms. Similarly, when the trees in a forest die and decay, chemical changes slowly return the matter in the trees to the environment.

Chemical Changes in the Non-Living Environment

Many chemical changes that do not involve living things also occur in nature.

One very common chemical change is what happens to metals that contain iron, especially when they are wet. This change is called rusting (Figure 2). You can see the product of this change—rust—on old bicycles, metal gardening tools, and old cars that have been through many seasons of rain and snow. The rust is soft and flaky—very different from the original shiny metal. When iron rusts, it combines with oxygen in the air to form a new substance.

LEARNING TIP

Compare this information with what you already knew about rusting. Ask yourself, “Is there any information here that is new to me?”

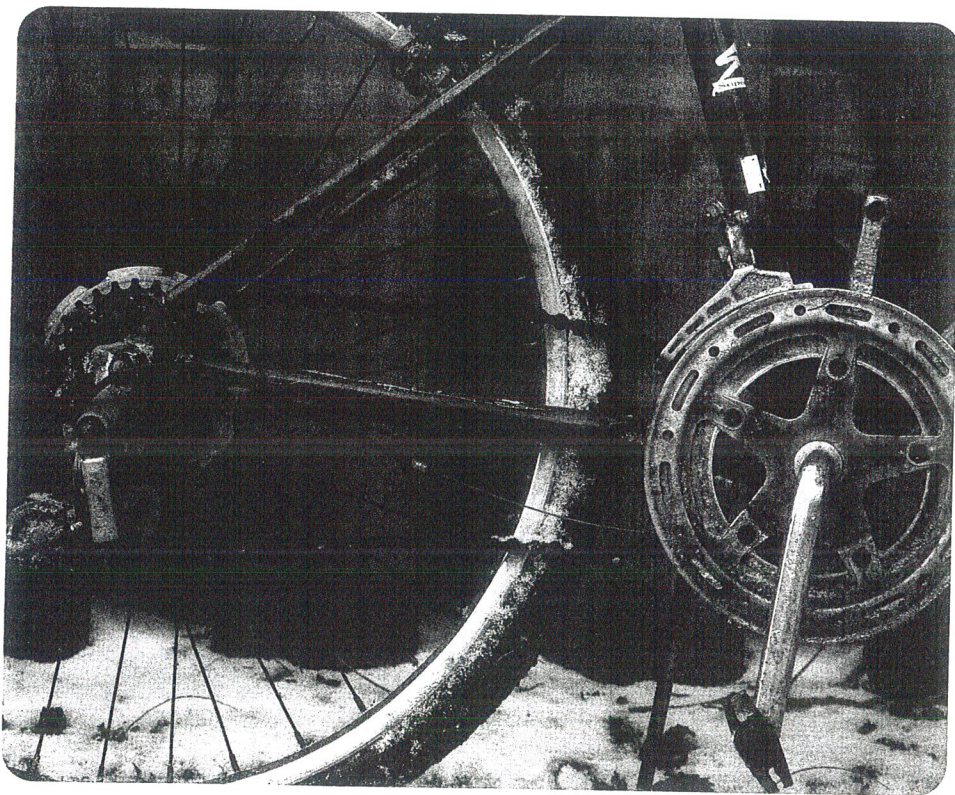


Figure 2

Iron reacting with oxygen to produce rust is an example of a chemical change. Rust damages objects made of metal, such as bicycles and cars.



Figure 3
When silver reacts with oxygen, the silver turns black. Silver tarnishing is a chemical change.

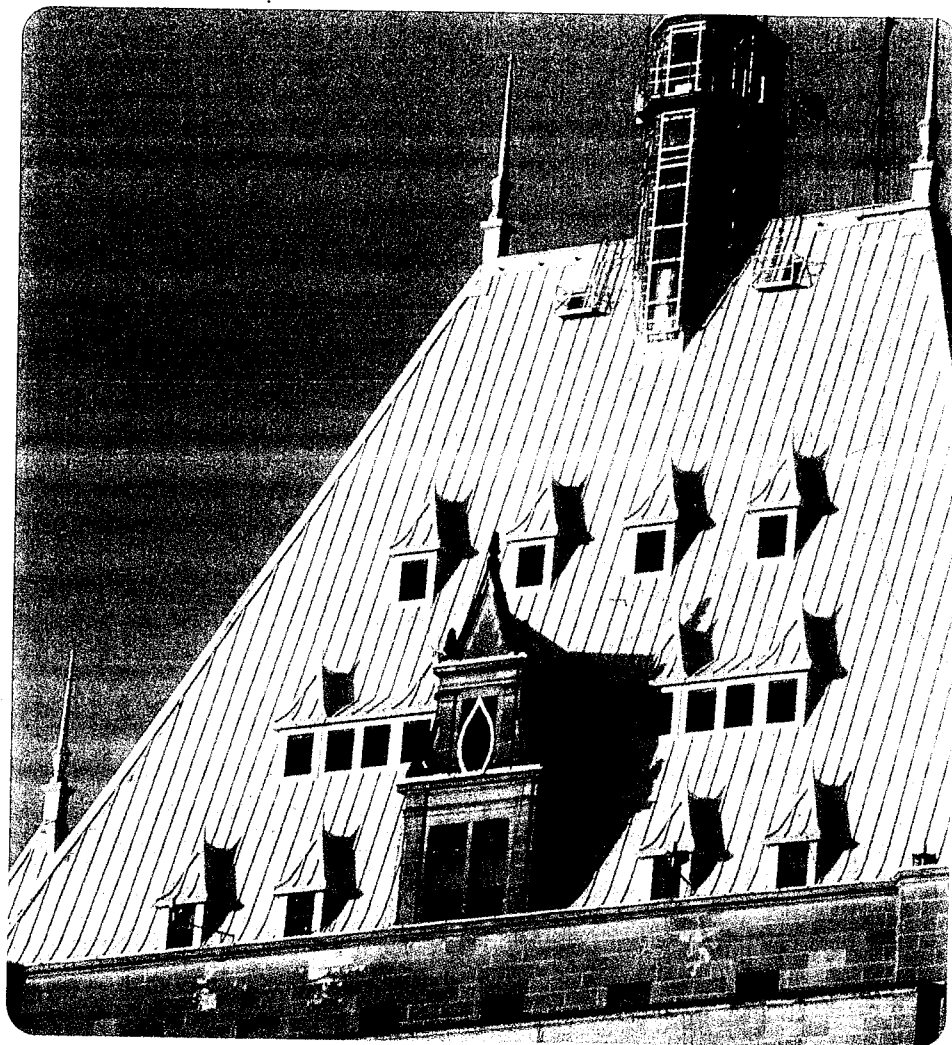


Figure 4
When copper tarnishes, it turns green, like the roof of Hotel Vancouver.

Other metals, such as silver and copper, also combine with oxygen in the air. The new substances that are formed are a different colour than the original silver and copper (Figures 3 and 4).

Many industries carry out chemical changes to make the materials that you use every day. Plastics (including vinyl and polyester) are all products of chemical changes. In the mining industry, chemical changes are carried out to separate valuable metals from rock.

CHECK YOUR UNDERSTANDING

1. How is a forest fire an example of a chemical change? List specific clues that support your answer.
2. What is rusting?
3. Name three chemical changes that do not require living organisms.