



Atomic Energy—Good and Bad

Activity

2

The majority of chemical elements never change. An element might combine with other elements to form compounds, but the structure of the atoms in each element remains the same. Such elements are stable. Some elements, in contrast, are not stable. They change over time, becoming different elements. As these elements change, they release energy. The energy they release is called radiation, so the elements are radioactive.

Once scientists understood the nature of radioactive elements, they realized that all atoms store a great deal of energy. Scientists found that splitting atoms releases energy in the form of heat and radiation. Splitting atoms is known as fission. Fission happens when the atoms of radioactive elements are bombarded with neutrons. The neutrons penetrate the nucleus of the atom and cause the atoms to divide in half. This splitting causes the release of tremendous amounts of energy, which can be harnessed.

Uses of Nuclear Energy

The first use of atomic energy was in warfare. Atomic bombs were made that split atoms upon impact, producing waves of searing heat and deadly levels of radiation. When the United States dropped fission bombs on Japan during World War II, hundreds of thousands of people were killed and much land was destroyed. Later, scientists learned to harness atomic energy for peaceful means, such as generating electricity.

After the war, nuclear reactors were built throughout the world. In a nuclear reactor, atoms of radioactive elements are split. Some of the

energy released is in the form of heat. The heat is used to produce steam, which powers turbines that create electricity and provide power to cities and factories.

In a nuclear reactor, the heat must be controlled. If too much heat builds up, it causes an explosion that releases radioactive elements into the air. The radioactive elements do not disappear. They are absorbed by other elements and can increase. Too much radiation is harmful to people, animals, and plants. It can cause sickness and even death.

Chornobyl and Beyond

Because radiation is so harmful to living things, great care has been taken to create safety procedures to prevent accidents. But in 1986, an accident did happen. In Chornobyl, Ukraine, part of the former Soviet Union, a steam buildup resulted in an explosion that released large amounts of radiation into the atmosphere. The explosion devastated the area around the reactor and caused 31 deaths. The radiation, blown by wind, was detected in places far away from Chornobyl.

Years later, the physical and psychological effects of the accident are still evident. There is a significant increase in thyroid cancer, especially among children. Anxiety and stress are apparent in people living in the affected areas. Large areas of agricultural land are still excluded from use due to contamination. Despite its risks, atomic power is very efficient and continues to be used in many places throughout the world.

Applying Critical Thinking Skills

1. Why is the use of nuclear energy controversial?
2. Do you think the benefits of nuclear power outweigh the potential dangers?
3. During the Cold War in the 1900s, the United States and the Soviet Union built up stores of atomic weapons. At the end of the Cold War, they reached agreements to limit the number of atomic weapons. Do you think all countries should agree to limit atomic weapons? Explain.