

Chapter 2**CRITICAL THINKING****● Matter and Its Changes****Atomic Energy**

Most elements never change. They combine with other elements to form compounds, but the structure of the atoms in the elements remains the same. These elements are called stable. Some elements are not stable. They change over time and become different elements. As these elements change, they release energy. The energy they release is called radiation, and the elements are called radioactive because they release the radiation.

Once scientists understood the nature of radioactive elements, they realized that atoms stored a great deal of energy. Scientists found that splitting atoms would release this 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. The dividing atoms release energy that can be used.

The first use of atomic energy was in warfare. Bombs were made that released so much energy in the form of great heat and radiation that hundreds of thousands of people were killed and much land was destroyed when the United States dropped fission bombs on Japan during World War II. Later, scientists learned to harness the energy for peaceful means. The energy released can be used to generate electricity.

Throughout the world, nuclear reactors were built. In the reactors, atoms of radioactive elements are split. Some of the energy released by the elements is in the form of heat. The heat is

used to produce steam, which powers turbines that create electricity. This electricity provides power to cities and factories.

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

Because radiation is so harmful to living things, great care has been taken to provide safety procedures that would prevent accidents. But in 1986, an accident did happen. In Chernobyl, USSR, a steam buildup resulted in an explosion that released great amounts of radiation into the atmosphere. The explosion devastated the area around the reactor and caused many deaths. The released radiation was blown by winds, and great amounts of it were detected in places very far away from Chernobyl. The full effects of the explosion on plant and animal life will not be known for many years.

The Chernobyl accident caused great concern throughout the world. Many people had long believed nuclear energy was not safe. The accident made them even more aware of the dangers of this form of energy. Many people want to eliminate or limit the use of atomic power. At the same time the demand for affordable energy increases and other sources of energy are limited.

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. Would you be willing to live close to a nuclear reactor?
4. The United States and the area formerly called the Soviet Union have both built atomic bombs. Both countries are interested in limiting the number of these weapons. Why do you think the countries want to limit the number of atomic weapons?