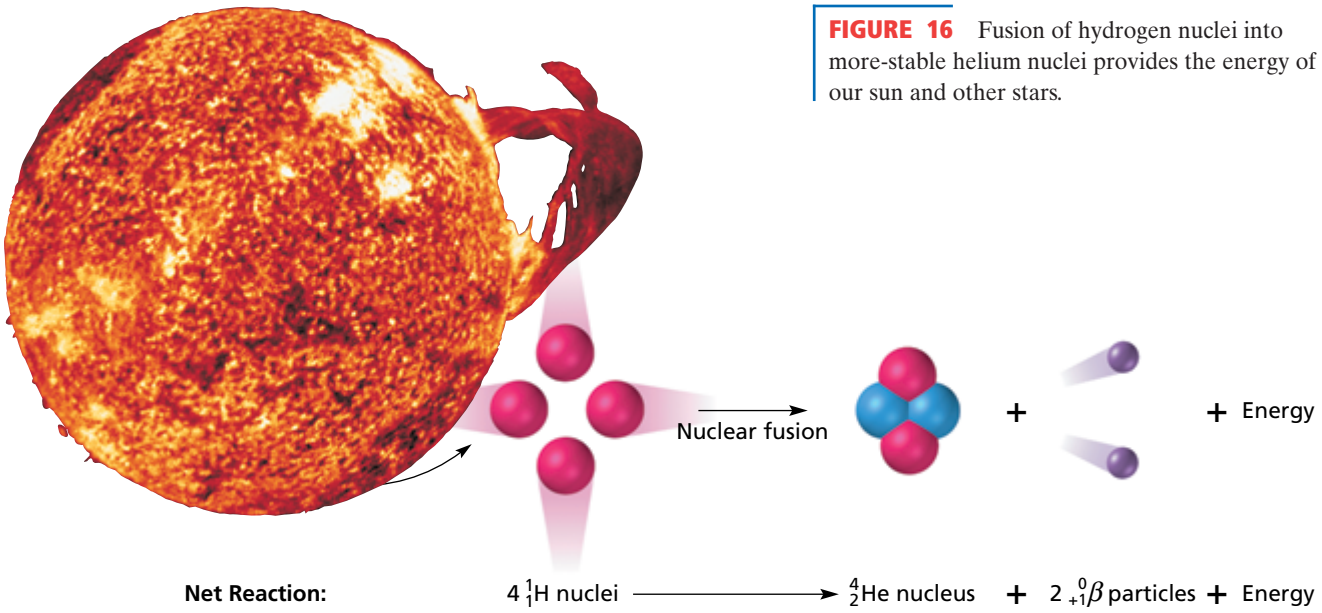

FIGURE 16 Fusion of hydrogen nuclei into more-stable helium nuclei provides the energy of our sun and other stars.

Nuclear Fusion

The high stability of nuclei with intermediate masses can also be used to explain nuclear fusion. *In* **nuclear fusion,** *low-mass nuclei combine to form a heavier, more stable nucleus.* Nuclear fusion releases even more energy per gram of fuel than nuclear fission. In our sun and stars that are similar to the sun, hydrogen nuclei combine at extremely high temperature and pressure to form a helium nucleus with a loss of mass and release of energy. The net reaction is illustrated in **Figure 16.**

If fusion reactions can be controlled, they could be used for energy generation. Researchers are currently studying ways to contain the reacting plasma that is required for fusion. A plasma is an extremely hot mixture of positive nuclei and electrons. There is no known material that can withstand the initial temperatures, about 10^8 K, required to induce fusion. Scientists use strong magnetic fields to suspend the charged plasma inside a container but away from the walls. Additionally, a large amount of energy is needed to initiate fusion reactions. For fusion to be a practical energy source, more energy needs to be generated by the reaction than is put into the reaction.

SECTION REVIEW

1. Distinguish between nuclear fission and nuclear fusion.
2. Define *chain reaction.*
3. List the five main components of a nuclear power plant.

Critical Thinking

4. **RELATING IDEAS** Explain how fusion is one of our sources of energy.