Section 10.4 Fission and Fusion

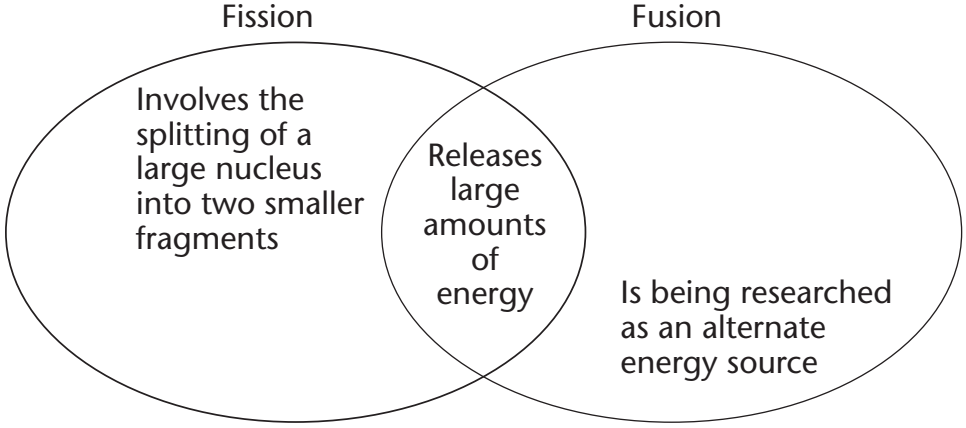
(pages 308–315)

This section discusses nuclear forces and the conversion of mass into energy. It also describes the nuclear processes of fission and fusion.

Reading Strategy (page 308)

Comparing and Contrasting As you read, contrast fission and fusion in the Venn diagram below by listing the ways they differ. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Contrasting Fission and Fusion



Nuclear Forces (pages 308–309)

1. Define the strong nuclear force. _____

_____

2. Is the following sentence true or false? Over very short distances, the strong nuclear force is much greater than the electric forces among protons. _____
3. Is the following sentence true or false? The strong nuclear force on a proton or neutron is much greater in a large nucleus than in a small nucleus. _____
4. All nuclei with 83 or more _____ are radioactive. Circle the correct answer.

   neutrons protons quarks

Fission (pages 309–313)

5. Define fission. _____

_____

6. Circle the letter that identifies what *c* represents in Einstein's mass-energy equation, $E = mc^2$.

a. the charge on a proton
b. the speed of light
c. the charge on an electron

7. Is the following sentence true or false? During nuclear reactions mass is not conserved, but energy is conserved. _____

8. Use the terms in the box to complete the following table about chain reactions.

Nuclear power plants	Nuclear weapons
Uncontrolled	Controlled

Chain Reactions		
Type of Chain Reaction	**Description**	**Example of An Application**
	All neutrons released during fission are free to cause other fissions.	
	Some of the neutrons released during fission are absorbed by nonfissionable materials.	

9. Define a critical mass. _____

_____

Fusion (page 315)

10. The state of matter in which atoms have been stripped of their electrons is _____. Circle the correct answer.

fusion ion plasma

11. Circle the letter of each main problem that scientists must face in designing a fusion reactor.

a. Extremely high temperatures are necessary for a fusion reaction to start.
b. The plasma that results from the reaction conditions must be contained.
c. The hydrogen needed as a starting material is extremely scarce.