Section 7.3
Nuclear Reactions
Check Your Understanding

Checking Concepts

1. What is nuclear fission?

2. What is nuclear fusion?

3. Write a nuclear equation representing a fission reaction that occurs in CANDU reactors.

4. Write a nuclear equation representing a fusion reaction that occurs at the centre of our Sun.

5. What is a chain reaction?

6. Write all the symbols that represent each of the following.

   (a) alpha particle

   (b) beta particle

   (c) proton

   (d) electron

   (e) neutron

   (f) hydrogen-1 nucleus

(g) helium-4 nucleus

7. Consider these particles taken together:

$^{1}_{0}n + {}^{235}_{92}U$

(a) What is the total mass number?

(b) What is the total atomic number?

8. Consider these particles taken together:

$^{92}_{36}Kr + {}^{141}_{56}Ba + 3\ {}^{1}_{0}n$

(a) What is the total mass number?

(b) What is the total atomic number?

Understanding Key Ideas

9. Consider the following nuclear equation.

$^{1}_{0}n + {}^{235}_{92}U \rightarrow {}^{92}_{36}Kr + {}^{141}_{56}Ba + 3\ {}^{1}_{0}n$ + energy.

(a) How was the uranium-235 induced to undergo a nuclear reaction?

(b) How many neutrons were produced by this process?

(c) Is this reaction a fusion reaction or a fission reaction?

(d) How could this reaction lead to a chain reaction that could result in a nuclear explosion?

(e) Does this reaction consume energy or release energy overall? Explain.

10. What is the indicated daughter nucleus?

(a) $^{1}_{0}n + {}^{235}_{92}U \rightarrow$ ____ $+ {}^{127}_{53}I + 3\ {}^{1}_{0}n$ + energy

(b) $^{1}_{0}n$ + $^{235}_{92}U$ ➔ ____ + $^{119}_{50}Sn$ + 3 $^{1}_{0}n$ + energy

(c) $^{1}_{0}n$ + $^{235}_{92}U$ ➔ ____ + $^{115}_{49}In$ + 3 $^{1}_{0}n$ + energy

11. Complete the following chart.

		Fission	Fusion
(a)	Does this reaction obey the law of conservation of mass?		
(b)	Is this reaction used for the production of electrical energy?		
(c)	Does this reaction produce radioactive by-products?		
(d)	Does this reaction involve the release of energy?		
(e)	Is this reaction used in nuclear weapons?		

Pause and Reflect

Suppose a House of Commons committee for the government of Canada has asked you to advise it on nuclear energy research. Although the committee members would be prepared to wait up to 20 years for energy production to come on line, they would like to pursue research in either fission technology or fusion technology, but not both. What advice would you give the committee to help them make a decision? What alternative would you suggest if you felt neither technology was a good choice?