

## Chapter 11 Quiz

### Part A: Modified True/False

Indicate whether each statement is true or false in the left-hand column. If the statement is false, change the statement to make it true.

- \_\_\_\_\_ 1. Scientists can change a stable isotope into a radioactive isotope by combining it with a beta particle. \_\_\_\_\_
- \_\_\_\_\_ 2. Radioisotopes used for PET imaging have short half-lives. \_\_\_\_\_
- \_\_\_\_\_ 3. A fission bomb is more powerful than a fusion bomb, if they have equal amounts of fuel. \_\_\_\_\_

### Part B: Matching

Match each term in the left column with the most appropriate term in the right column.

- |                       |              |
|-----------------------|--------------|
| _____ 4. nuclear fuel | (a) boron    |
| _____ 5. moderator    | (b) uranium  |
| _____ 6. control rod  | (c) graphite |

### Part C: Multiple Choice

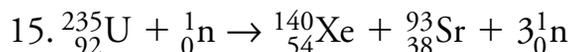
Circle the letter beside the answer that best completes the statement or answers the question.

7. What technology allows scientists to produce radioactive isotopes that do not occur naturally?
- |                          |                                 |
|--------------------------|---------------------------------|
| A. electric generators   | C. computed tomography          |
| B. particle accelerators | D. positron emission tomography |
8. In what type of atomic bomb is the nuclear fuel stored in separate sections that are then forced together?
- |                   |                       |
|-------------------|-----------------------|
| A. explosion bomb | C. gun-type bomb      |
| B. implosion bomb | D. chemical-type bomb |
9. How does a control rod control the rate of a chain reaction?
- |                            |                             |
|----------------------------|-----------------------------|
| A. by producing neutrons   | C. by absorbing neutrons    |
| B. by speeding up neutrons | D. by slowing down neutrons |
10. What is one major concern associated with the operation of a nuclear power plant?
- |                                |                                   |
|--------------------------------|-----------------------------------|
| A. low production of heat      | C. disposal of radioactive waste  |
| B. emission of sulphur dioxide | D. generation of greenhouse gases |

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Chapter 11 Quiz (continued)**

11. What is the function of water in a typical nuclear reactor?
- A. to add heat  
B. to remove heat  
C. to accept neutrons  
D. to liberate neutrons
12. By which process does the Sun generate most of its heat?
- A. fusion  
B. fission  
C. beta decay  
D. alpha decay
13. Which need poses a major obstacle to the development of nuclear fusion reactors?
- A. huge amounts of fuel  
B. extremely high temperatures  
C. huge amounts of moderator  
D. extremely low temperatures
14. How much energy would be generated if a positron of mass  $9.11 \times 10^{-31}$  kg were converted completely into energy?
- A.  $5.2 \times 10^{-17}$  J  
B.  $6.2 \times 10^{-16}$  J  
C.  $7.2 \times 10^{-15}$  J  
D.  $8.2 \times 10^{-14}$  J

**Part D: Short Answer**

One of the decay paths of uranium-235 is shown above. Using the masses given below, find the energy released in the fission of one uranium-235 atom. Show your work in the space below.

Element	atomic mass unit	mass (kg)
uranium-235	235.0439299	$390.29957 \times 10^{-27}$
neutron	1.008664915	$1.6749272 \times 10^{-27}$
<b>Total</b>	236.0525948	$391.97450 \times 10^{-27}$

Element	atomic mass unit	mass (kg)
xenon-140	139.9216357	$232.34531 \times 10^{-27}$
strontium-93	92.9140224	$154.28734 \times 10^{-27}$
neutron ( $\times 3$ )	3.0259947	$5.0247818 \times 10^{-27}$
<b>Total</b>	235.8616528	$391.65743 \times 10^{-27}$