

## Nuclear Chemistry

### Reviewing Vocabulary

Match the definition in Column A with the term in Column B.

#### Column A

1. The difference between the mass of a nucleus and the sum of its nucleons
2. The process in which an atom of one element changes into an atom of another element
3. A force that acts only on subatomic particles that are extremely close together
4. A fusion reaction that takes place only at very high temperatures
5. Isotopes of atoms with unstable nuclei that emit radiation
6. The area on a graph plotting neutrons and protons within which all stable nuclei are found
7. Radiation energetic enough to ionize matter with which it collides
8. The artificial production of a nuclear reaction that involves striking the nuclei with high-velocity charged particles
9. A way of determining the age of very old objects using radioactive materials
10. A form of high-energy electromagnetic radiation
11. A term to describe a sample of fissionable material that is massive enough to sustain a chain reaction
12. Another name for a proton or neutron
13. A radioisotope that emits non-ionizing radiation and is used to signal the presence of an element or specific substance
14. A series of nuclear reactions beginning with an unstable nucleus and resulting in the formation of a stable nucleus
15. Any element with an atomic number greater than 92
16. A transmutation process brought about when an electron is absorbed by a nucleus
17. Reactors able to produce more fuel than they use

#### Column B

- a. strong nuclear force
- b. band of stability
- c. nucleon
- d. radioactive decay series
- e. induced transmutation
- f. thermonuclear reaction
- g. critical mass
- h. electron capture
- i. mass defect
- j. breeder reactor
- k. transuranium element
- l. ionizing radiation
- m. transmutation
- n. radiochemical dating
- o. radiotracer
- p. radioisotope
- q. X rays

### Understanding Main Ideas (Part A)

Circle the letter of the choice that best completes the statement or answers the question.

1. The person who named radioactivity as the process in which materials give off rays and particles is  
 a. Marie Curie.    b. Henri Becquerel.    c. Wilhelm Roentgen.    d. Ernest Rutherford.
2. The most penetrating form of nuclear radiation is  
 a. alpha rays.    b. beta rays.    c. gamma rays.    d. positrons.
3. In an atom, the strong nuclear force acts on  
 a. protons only.    b. neutrons only.    c. protons and neutrons.    d. protons, neutrons, and electrons.
4. During the process of electron capture, an electron from outside the nucleus joins with a proton to form  
 a. a neutron.    b. a positron.    c. another proton.    d. a gamma ray.
5. What is the symbol used for a neutron in balancing nuclear equations?  
 a. n    b.  ${}^0_1\text{n}$     c.  ${}^1_0\text{n}$     d.  ${}^0_1\text{n}$
6. The half-life of calcium-47 is about 5 days. Starting with 64 g of this isotope, what would be the amount remaining after 20 days?  
 a. 32 g    b. 16 g    c. 8 g    d. 4 g
7. One product of all nuclear fission reactions is  
 a. protons.    b. energy.    c. electrons.    d. neutrons.
8. Mass is lost or gained in  
 a. all chemical reactions.    b. all nuclear fission reactions.    c. all nuclear fusion reactions.    d. all chemical and nuclear reactions.
9. A chain reaction will NOT take place in a piece of uranium if  
 a. the temperature is too low.    b. there are too many neutrons.    c. there are too few neutrons.    d. the piece of uranium is too large.
10. One of the most serious problems surrounding the use of nuclear power plants is  
 a. finding a way to dispose of spent fuel rods.    b. the high cost of coolant needed.    c. a lack of uranium.    d. initiating a chain reaction in the fuel.
11. Fusion reactions require  
 a. very heavy nuclei.    b. incredibly high temperatures.    c. very rare elements for use as fuel.    d. no initial energy.