



# Chemistry

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

Section \_\_\_\_\_

HALF-LIFE WS

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

*Directions (1-7): For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question.*

- 1 What is the total number of years that must pass before only 25.00 grams of an original 100.0-gram sample of C-14 remains unchanged?  
(1) 2865 y                      (3) 11 430 y  
(2) 5730 y                      (4) 17 190 y
- 2 Which nuclide is listed with its half-life and decay mode?  
(1) K-37, 1.24 h,  $\alpha$   
(2) N-16, 7.13 s,  $\beta^-$   
(3) Rn-222,  $1.6 \times 10^3$  y,  $\alpha$   
(4) U-235,  $7.1 \times 10^8$  y,  $\beta^-$
- 3 What is the half-life of a radioisotope if 25.0 grams of an original 200.-gram sample of the isotope remains unchanged after 11.46 days?  
(1) 2.87 d                      (3) 11.46 d  
(2) 3.82 d                      (4) 34.38 d
- 4 If  $\frac{1}{8}$  of an original sample of krypton-74 remains unchanged after 34.5 minutes, what is the half-life of krypton-74?  
(1) 11.5 min                      (3) 34.5 min  
(2) 23.0 min                      (4) 46.0 min
- 5 An original sample of K-40 has a mass of 25.00 grams. After  $3.9 \times 10^9$  years, 3.125 grams of the original sample remains unchanged. What is the half-life of K-40?  
(1)  $1.3 \times 10^9$  y              (3)  $3.9 \times 10^9$  y  
(2)  $2.6 \times 10^9$  y              (4)  $1.2 \times 10^{10}$  y
- 6 The decay of which radioisotope can be used to estimate the age of the fossilized remains of an insect?  
(1) Rn-222                      (3) Co-60  
(2) I-131                        (4) C-14
- 7 What is the half-life and decay mode of Rn-222?  
(1) 1.91 days and alpha decay  
(2) 1.91 days and beta decay  
(3) 3.82 days and alpha decay  
(4) 3.82 days and beta decay

*Directions (8-12):* Answer the following questions based on your knowledge of chemistry.

- 8 Po-218 has a half-life of 3.04 minutes. Determine the original mass of a sample of Po-218, if 0.50 milligram of the sample remains unchanged after 12.16 minutes.

\_\_\_\_\_ milligrams

- 9 Determine the half-life of krypton-92 if only 6.0 milligrams of an original 96.0-milligram sample remains unchanged after 7.36 seconds.

\_\_\_\_\_ seconds

- 10 Cobalt-60 is commonly used as a source of radiation for the prevention of food spoilage. Bombarding cobalt-59 nuclei with neutrons produces the nuclide cobalt-60. A food irradiation facility replaces the cobalt-60, a source of gamma rays, when the radioactivity level falls to  $\frac{1}{8}$  of its initial level.

Determine the total number of years that elapse before an original cobalt-60 source in an irradiation facility must be replaced.

\_\_\_\_\_ years

- 11 The fossilized remains of a plant were found at a construction site. The fossilized remains contain  $\frac{1}{16}$  the amount of carbon-14 that is present in a living plant.

Determine the approximate age of these fossilized remains.

\_\_\_\_\_ years

- 12 A sample of wood is found to contain  $\frac{1}{8}$  as much C-14 as is present in the wood of a living tree. What is the approximate age, in years, of this sample of wood?

\_\_\_\_\_ years