

## 25

## NUCLEAR CHEMISTRY

## Practice Problems

For your assessment, solve the following problems.

## SECTION 25.1 NUCLEAR RADIATION

1. What happens to the mass number and atomic number of an atom that undergoes beta decay?
2. A radioactive isotope of an element undergoes alpha particle decay. What are the atomic number and mass number of the particle released?
3. Give the composition of the nucleus of the following isotopes.
  - a.  $^{110}\text{Ag}$
  - b.  $^{111}\text{Ag}$
  - c.  $^{112}\text{Ag}$
4. Complete each of the following equations.
  - a.  $^{14}\text{N} \rightarrow \text{Xe} + \text{?}$
  - b.  $^{235}\text{U} \rightarrow \text{Xe} + \text{?}$
  - c.  $^{238}\text{U} \rightarrow \text{Xe} + \text{?}$

## SECTION 25.2 NUCLEAR TRANSFORMATIONS

1. Write a nuclear equation for the following radioactive processes.
  - a. alpha decay of thorium-230
  - b. electron capture by barium-57
  - c. beta emission by argon-37
  - d. proton emission by fluorine-17
2. Complete the equations for these beta-emission reactions.
  - a.  $^{38}\text{Ar} \rightarrow \text{Xe} + \text{?}$
  - b.  $^{137}\text{Cs} \rightarrow \text{Xe} + \text{?} + ^{133}\text{Ba} + \text{?}$
  - c.  $^{36}\text{Ar} \rightarrow \text{Xe} + \text{?} + \text{?}$
  - d.  $^{137}\text{Cs} \rightarrow \text{Xe} + \text{?} + \text{Xe} + \text{?}$
  - e.  $\text{Xe} + \text{?} \rightarrow ^{137}\text{Cs} + \text{Xe} + \text{?} + \text{?}$
3. Polonium-214 has a relatively short half-life of 1.364 s. How many atoms would it take for 1.00 g of this isotope to decay to 0.001 g?
4. If one atom loses about 0.001 g of protactinium-231 to decay to 1.0 g, the half-life of protactinium-231 is 1.23 years.
5. By approximately what factor would the mass of an sample of copper-63 decrease in 10 minutes? The half-life of copper-63 is 1.78 years.
6. If a 5.00 g sample, 0.001 g of copper-63 decays to 0.10 g, what is the half-life of copper-63?

# Study Guide Nuclear Radiation Answerd

**Julie R. Frentrup**

## **Study Guide Nuclear Radiation Answer:**

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