

## Chapter 21 practice test-

- 1) By what process does thorium-230 decay to radium-226 \_\_\_\_\_?
  - A) gamma emission
  - B) alpha emission
  - C) beta emission
  - D) electron capture
  - E) positron emission
  
- 2) Which type of radioactive decay results in no change in mass number and atomic number for the starting nucleus?
  - A) alpha
  - B) beta
  - C) positron emission
  - D) electron capture
  - E) gamma
  
- 3) What order process is radioactive decay \_\_\_\_\_?
  - A) zeroth
  - B) first
  - C) second
  - D) third
  - E) fourth
  
- 4)  $^{131}\text{I}$  has a half-life of 8.04 days. Assuming you start with a 1.53 mg sample of  $^{131}\text{I}$ , how many mg will remain after 13.0 days \_\_\_\_\_?
  - A) 0.835
  - B) 0.268
  - C) 0.422
  - D) 0.440
  - E) 0.499
  
- 5) Atoms containing radioactive nuclei are called
  - A) radionuclides.
  - B) radioisotopes.
  - C) nucleons.
  - D) nuclides.
  - E) radioisophores.
  
- 6) What happens to the mass number and the atomic number of an element when it undergoes beta decay?
  - A) Neither the mass number nor the atomic number change.
  - B) The mass number decreases by 4 and the atomic number decreases by 2.
  - C) The mass number does not change and the atomic number increases by 1.
  - D) The mass number does not change and the atomic number decreases by 2.
  - E) The mass number increases by 2 and the atomic number increases by 1.

7) Which one of the following is a correct representation of a beta particle?



8) Of the following processes, which one changes the atomic number?

A) alpha emission

B) beta emission

C) electron capture

D) positron emission

E) All of these processes change the atomic numbers.

9) The beta decay of cesium-137 has a half-life of 30 years. How many years must pass to reduce a 25 mg sample of cesium 137 to 8.7 mg?

A) 46

B) 32

C) 3.2

D) 50

E) 52

10) The basis for the carbon-14 dating method is that

A) the amount of carbon-14 in all objects is the same.

B) carbon-14 is very unstable and is readily lost from the atmosphere.

C) the ratio of carbon-14 to carbon-12 in the atmosphere is a constant.

D) living tissue will not absorb carbon-14 but will absorb carbon-12.

E) All of the above are correct.

11) The half-life for the beta decay of potassium-40 is  $1.3 \times 10^9$  years. What is the rate constant for this decay?

Answers-

1. B

2. E

3. B

4. E

5. B

6. C

7. D

8. E

9. A

10. C

11.  $t_{1/2} = 0.693/k$

$$1.3 \times 10^9 \text{ years} = 0.693/k$$

$$k = 5.3 \times 10^{-10} \text{ year}^{-1}$$