Name _____ Date _____ Class _____

25.2 NUCLEAR TRANSFORMATIONS

Section Review

Objectives

- Describe the type of decay a radioisotope undergoes
- Make calculations that involve half-life
- Explain the two ways transmutations can occur

Vocabulary

- band of stability
- positron
- half-life
- transmutation
- transuranium elements

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

Nuclei that lie outside the ___1___ undergo spontaneous radioactive decay. Nuclei with too many neutrons undergo ___2___ emission as neutrons are converted to protons. A ___3___ is a particle with a positive charge and the mass of an electron.

Every radioisotope decays at a characteristic ___4___. A ___5___ is the time required for one half of the nuclei in a radioisotope to decay. The product nuclei may or may not be ___6___. Half-lives vary from fractions of a second to ___7___ of years.

The conversion of atoms of one element to atoms of another is called ___8___. This process can occur by ___9___ or when particles bombard the nucleus of an atom. All of the elements with ___10___ above 92 have been ___11___ in nuclear reactors or accelerators.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____

Name _____ Date _____ Class _____

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

_____ **12.** If you start with one mole of a radioisotope, after 10 half-lives, there will be none of the isotope left.

_____ **13.** A radioisotope has a half-life of 12 minutes. After 36 minutes only one third of the radioactive atoms initially present will remain.

_____ **14.** Transuranium elements have atomic numbers greater than 92.

_____ **15.** Transmutation reactions occur spontaneously.

_____ **16.** Positively charged particles have the mass of an electron.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A	Column B
_____ **17.** band of stability	**a.** conversion of an atom of one element to an atom of another element
_____ **18.** positron	**b.** time required for one half of the nuclei of a radioisotope to decay to products
_____ **19.** half-life	**c.** region containing stable nuclei in a neutron vs. proton plot
_____ **20.** transmutation	**d.** elements with atomic numbers higher than 92
_____ **21.** transuranium elements	**e.** particle with the same mass as an electron but with a positive charge

Part D Questions

Answer the following in the space provided.

22. Sodium-24 has a half-life of 15 hours. How much sodium-24 will remain in an 18.0-g sample after 60 hours?

23. After 42 days, a 2.0-g sample of phosphorus-32 contains only 0.25 g of isotope. What is the half-life of phosphorus-32?