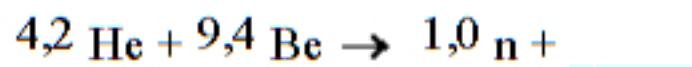


Chapter 5

(Nuclear Chemistry)

Self Assessment A (Chemistry by Raymond Chang)

- Alpha particles are identical to
A. protons. B. helium atoms. C. hydrogen atoms. D. helium nuclei. E. electrons.
- Beta particles are identical to
A. protons. B. helium atoms. C. hydrogen atoms. D. helium nuclei. E. electrons.
- As a result of beta decay, the product nucleus is
A. one atomic number lower than the original element.
B. two atomic numbers higher than the original element.
C. one atomic number higher than the original element.
D. two atomic numbers lower than the original element.
E. four atomic numbers lower than the original element.
- When atoms of beryllium-9 are bombarded with alpha particles, neutrons are produced.
What new isotope is also formed?



- A. ${}^{12}_6\text{C}$ B. ${}^{5}_3\text{Li}$ C. ${}^{8}_3\text{Li}$ D. ${}^{10}_5\text{B}$ E. ${}^{12}_5\text{B}$

7. What is the nuclear binding energy per nucleon, in joules, for $^{25}_{12}\text{Mg}$ (atomic mass 24.985 839 amu). Data: ^1_1H (atomic mass) = 1.007 825 amu; ^1_0n (mass) = 1.008665 amu; $1\text{ kg} = 6.022 \times 10^{26}\text{ amu}$; $c = 3.00 \times 10^8\text{ m/s}$.
- A. 0.22076 J/nucleon
B. 3.30×10^{-11} J/nucleon
C. 1.32×10^{-12} J/nucleon
D. 0.999 J/nucleon
E. None of the above.
8. If 12% of a certain radioisotope decays in 5.2 years, what is the half-life of this isotope?
- A. 0.59 yr B. 1.7 yr C. 22 yr D. 28 yr E. 32 yr
9. The ^{14}C activity of some ancient Peruvian corn was found to be 10 disintegrations per minute per gram of carbon. If present-day plant life shows 15 dpm/g, how old is the Peruvian corn? The half-life of ^{14}C is 5730 yr.
- A. 1,455 yr B. 1,910 yr C. 3,350 yr D. 3,820 yr E. 9,080 yr
10. Which one of the following statements about fission and fusion is *false*?
- A. Fission occurs among the heaviest isotopes, whereas fusion occurs more readily for light isotopes.
B. For a fission reaction the mass defect (Δm) is negative, whereas for fusion Δm is positive.
C. In order for fusion reactions to occur, temperatures must be in the millions of degrees.
D. The fission of Pu-239 atoms produces a great number of isotopes of a large number of elements.
E. Neutron-induced fission processes can occur at room temperature, rather than at millions of degrees.