

For help with these problems

www.tutor-homework.com

Be sure to mention the filename:

Physics_Questions_0038

www.tutor-homework.com (for tutoring, homework help, or help with online classes)

Question 1

2 / 2 points

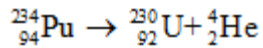
Assuming the radius of a hydrogen atom is given by the Bohr radius, $r_{\text{Bohr}} = 5.29 \times 10^{-11} \text{ m}$, what is the ratio of the nuclear density of a hydrogen atom to its atomic density? **Note:** Assume for this calculation that the mass of the atom is equal to the mass of the proton.

- a) 1.2×10^{-14}
- b) 4.4×10^4
- c) 2.3×10^{-5}
- d) 3.9×10^{17}
- e) 8.6×10^{13}

Question 2

2 / 2 points

Determine the amount of energy released in the following alpha decay process:



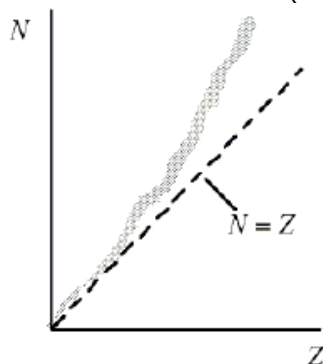
The relevant atomic masses are ${}_{94}^{234}\text{Pu} = 234.043\,299 \text{ u}$, ${}_{92}^{230}\text{U} = 230.033\,937 \text{ u}$, and ${}_2^4\text{He} = 4.002\,603 \text{ u}$.

- a) 927 keV
- b) 6.30 MeV
- c) 10.6 MeV
- d) 3.73 keV
- e) 8.04 MeV

Question 3

2 / 2 points

This question refers to the figure shown. Which one of the following concepts explains why heavy nuclei do not follow the $N = Z$ line (or trend) in the figure?



- a) transmutation
- b) Pauli exclusion principle
- c) particle-wave duality
- d) Heisenberg uncertainty principle
- e) Coulomb repulsion

Question 4

2 / 2 points

The ratio of the abundance of carbon-14 to carbon-12 in a sample of dead wood is one quarter the ratio for living wood. If the half-life of carbon-14 is 5730 years, which one of the following expressions determines how many years ago the wood died?

- a) 2×5730
- b) 0.25×5730
- c) 4×5730
- d) 0.75×5730
- e) 0.50×5730

Question 5

2 / 2 points

The proton has a mass of 1.007 28 u; and the neutron has a mass of 1.008 67. Use this information to determine the binding energy per nucleon of ${}_{90}^{232}\text{Th}$ which has an atomic mass of 232.038 054 u.

- a) 9.8 MeV
- b) 8.7 MeV
- c) 6.5 MeV
- d) 10.2 MeV
- e) 7.4 MeV

Question 6

2 / 2 points

The half-life of ${}_{79}^{200}\text{Au}$ is 2.88×10^3 s. What is the mass of a sample of ${}_{79}^{200}\text{Au}$ that has an activity of 1.42×10^{12} Bq?

- a) 2.41×10^{-3} g
- b) 9.80×10^{-9} g
- c) 5.89×10^{-12} g
- d) 1.96×10^{-6} g
- e) 2.78×10^{-15} g

Question 7

2 / 2 points

In a beta decay process, not all of the released energy is carried by the beta particle. Who proposed the existence of the neutrino in 1930 to account for the missing energy?

- a) Wolfgang Pauli
- b) Werner Heisenberg
- c) Enrico Fermi
- d) Erwin Schrödinger
- e) Niels Bohr

Question 8

2 / 2 points

The binding energy of an isotope of chlorine is 298 MeV. What is the mass defect of this chlorine nucleus in atomic mass units?

- a) 0.034 u
- b) 0.320 u
- c) 3.13 u
- d) 0.882 u
- e) 2.30 u

Question 9

2 / 2 points

Which one of the following thicknesses of lead would be least effective in stopping β rays?

- a) 0.50 mm
- b) 0.45 mm
- c) 0.04 mm

- d) 0.15 mm
- e) 0.30 mm

Question 10

2 / 2 points

Which one of the following statements is true concerning the radioisotope carbon-14 that is used in carbon dating?

- a) Carbon-14 is produced by the decay of carbon-12.
 - b) Carbon-14 is produced during β^- decay.
 - c) Carbon-14 is produced by cosmic rays striking the atmosphere.
 - d) Carbon-14 is produced by living cells.
 - e) Carbon-14 is produced by cells after they have died.
-