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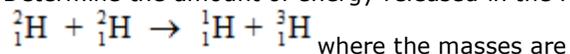
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Question 1

2 / 2 points

Determine the amount of energy released in the following reaction:



$${}^2_1\text{H} = 2.014\,102\text{ u}; \quad {}^1_1\text{H} = 1.007\,825\text{ u}; \quad \text{and} \quad {}^3_1\text{H} = 3.016\text{ u}.$$

- a) 4.03 MeV
- b) 2.02 MeV
- c) 2.02 eV
- d) 8.00 MeV
- e) 4.03 eV

Question 2

2 / 2 points

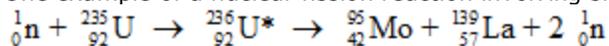
What is the antiparticle of an electron?

- a) n^+
- b) electron (self)
- c) photon
- d) ν^+
- e) β^+

Question 3

2 / 2 points

One example of a nuclear fission reaction involving slowly moving neutrons is



What is the total kinetic energy (in eV) of the products of the reaction? The relevant masses are:

$${}^{235}_{92}\text{U} = 235.043\,924\text{ u}, \quad {}^{95}_{42}\text{Mo} = 94.9058\text{ u}, \quad {}^{139}_{57}\text{La} = 138.9061\text{ u}, \quad \text{and} \quad {}^1_0\text{n} = 1.0087\text{ u}.$$

- a) 4102 MeV
- b) 208.0 MeV
- c) 1879 MeV
- d) 640.4 MeV
- e) 219 700 MeV

Question 4

2 / 2 points

Complete the following statement: The term *ionizing radiation* does not apply to

- a) X-ray photons.
- b) positrons.
- c) electrons.
- d) alpha particles.
- e) radio photons.

Question 5

2 / 2 points

A physicist wishes to measure the exposure of a beam of gamma rays. The beam is passed through 2.00×10^{-2} kg of dry air at STP. The beam produces positive ions in the air which have a total charge of 3.87×10^{-6} C. What is the exposure (in roentgens) of the beam?

- a) $1.94 \times 10^{-4} \text{ R}$
- b) $7.74 \times 10^{-8} \text{ R}$
- c) 1.25 R
- d) $3.25 \times 10^{-2} \text{ R}$
- e) 0.750 R

Question 6

2 / 2 points

Determine the amount of energy released in the following reaction: ${}^2_1\text{H} + {}^2_1\text{H} \rightarrow {}^4_2\text{He}$. Use the following information for your calculation: ${}^2_1\text{H}$ has a mass of 2.014 102 u, ${}^4_2\text{He}$ has a mass of 4.002 603 u, and $1 \text{ u} = 931.5 \text{ MeV}$.

- a) 11.9 MeV
- b) 7480 MeV
- c) 0.20 MeV
- d) 23.8 MeV
- e) 257 MeV

Question 7

2 / 2 points

Which one of the following particles is not a baryon?

- a) lambda particle
- b) pion
- c) sigma particle
- d) neutron
- e) proton

Question 8

2 / 2 points

Which one of the following particles is not a member of the *hadron* family?

- a) pion
- b) proton
- c) kaon
- d) neutron
- e) muon

Question 9

2 / 2 points

Note the forces:

- (1) weak nuclear force
- (2) strong nuclear force
- (3) gravitational force
- (4) electromagnetic force

Through which force(s) can leptons interact?

- a) only 2, 3 and 4
- b) only 1
- c) only 2
- d) only 1 and 2
- e) only 1, 3, and 4

Question 10

2 / 2 points

Consider the nuclear reaction ${}^{235}_{92}\text{U} \rightarrow X + {}^{94}_{40}\text{Zr} + n$ and the masses: ${}^{235}_{92}\text{U} = 235.0439 \text{ u}$; ${}^{94}_{40}\text{Zr} = 93.9063 \text{ u}$; $n = 1.008 67 \text{ u}$. If 208.66 MeV of energy is released in this reaction, determine the mass of X.

- a) 40.962 u

- b) 139.905 u
 - c) 39.962 u
 - d) 38.970 u
 - e) 84.589 u
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