

Review exercises –7:

1. The mass of our pencil is 10 grams. The equivalent mass energy is _____

a. 2.5×10^{14} kWh

c. 2.5×10^8 kWh

b. 0.83×10^3 kWh

d. 0.83×10^6 kWh

2. The total mass energy of 200 grams of carbon is _____

a. 1.8×10^{16} joules

c. 1.8×10^{16} Btu

b. 9×10^{16} joules

d. 3.6×10^{16} calories

3. The following reaction takes place: ${}_4^9\text{Be}_5 + {}_2^4\text{He}_2 \rightarrow {}_6^{12}\text{C}_6 + \text{X}$,

What is X _____

a. a neutron

c. an alpha particle

b. a proton

d. a deuteron



4. In the radioactive decay of ${}^{14}_6\text{C}$ to ${}^{14}_7\text{N}$, the following particles are emitted _____

- a. an electron (negative) and an antineutrino
- b. an electron (positive) and neutrino
- c. only an electron (negative)
- d. an alpha particle

5. The half-life of ${}^{137}\text{Cs}$ is 30 years. In how many years will a 1000 Ci source be down to 62.5 Ci? _____

- a. 150
- b. 60
- c. 90
- d. 120

6. The reason that thermal neutrons (0.025 eV) are used in conventional light-water reactors such as the BWR is _____

- a. the probability of a thermal neutron causing a fission reaction with ${}^{235}\text{U}$ is very high
- b. the probability of a thermal neutron causing a fission reaction with ${}^{238}\text{U}$ is very high
- c. there is no choice since the neutrons are going to be slowed down in the coolant anyway
- d. the neutrons that come from fission are thermal to begin with, so there is no choice



7. In a typical fission of a uranium nucleus, the number of neutrons emitted is about _____

- a. zero to 1 **b.** 2 to 3 c. 10 to 12 d. 235

8. In a typical 1000 MW_e nuclear power plant, about how many uranium nuclei are fissioning per second? _____

- a. 10³ b. 10¹⁰ c. 10¹⁵ **d.** 10²⁰ e. 10²⁵ f. 10³⁰ g. 10³⁵ h. 10⁴⁰

9. The three isotopes known to be good fission reactor fuels are _____

- a. ¹²C, ⁹⁰Sr, ²³⁹Pu **c.** ²³³U, ²³⁵U, ²³⁹Pu
b. ⁹⁰Sr, ¹³⁷Cs, ²³²Th d. ²³¹U, ²³⁷U, ²³⁹Pu

10. The fuel rods in a commercial thermal light water reactor such as the BWR have in them initially _____

- a. natural UO₂ pellets
b. UO₂ pellets with ²³⁵U enriched to about 3%
c. UO₂ pellets with 100% ²³⁵U
d. UO₂ pellets with 100% ²³⁸U

