UNIT 27 NUCLEAR PHYSICS

MULTIPLE CHOICE QUESTION MCQs

1. Identify particle x in the following nuclear reaction

$$^{9}_{4}Be + ^{4}_{2}He \rightarrow ^{12}_{6}C + x$$

(a) Electron (b) proton

(c) neutron (d) photon

2. In the equation $^{27}_{13}Al + ^{4}_{2}He \rightarrow ^{30}_{15}P + x$, The correct symbol for x is:

(a) $^{-1}_{0}e$ (b) $^{1}_{1}H$

(c) $^{4}_{2}He$ **(d)** $^{1}_{0}n$

3. Beta rays emitted by a radioactive material are:
(a) Electromagnetic radiations
(b) The electrons orbiting around the nucleus
(c) Charged particles emitted by the nucleus
(d) Neutral particles

4. The number of α and β particles emitted in the following radioactive decay is:

$$^{200}_{90}X \rightarrow ^{168}_{80}Y \rightarrow ^{?}_{?}X$$

(a) 8 and 6 (b) 6 and 8

(c) 8 and 8 (d) 6 and 6

5. If radium has a half-life of 5 years. Thus, for a nucleus in a sample of radium, the probability of decay in ten years is:
(a) 50% **(b) 75%**
(c) 100% (d) 60%

6. Emission of particles by an element affects its mass number A in the following way:
(a) Increases by 1 (b) decreases by 1
(c) Increases by 2 **(d) remains the same**

7. As the number of nucleons in a nucleus increases, the binding energy per nucleon:
(a) Increases continuously with mass number
(b) Decreases continuously with mass number
(c) remains constant with mass number
(d) First increases and then decreases with increase of mass number

8. A moderator in a nuclear reactor slows down the neutrons to:
(a) Decrease the probability of escape
(b) Increase the probability of nuclear fission
(c) Decrease the probability of absorption
(d) all of the above

9. Emission of, β^{+1} particles by an element affects its atomic number **Z** in the following way:
(a) Increases by 1 **(b) decreases by 1**
(c) Increases by 2 (d) remains the same

10. The half-life period of a radioactive element is 100 days. After 400 days, 16 g of the element will be reduced to
(a) 8g (b) 4g
(c) 2g **(d) 1g**

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EXAMS PRACTICE MULTIPLE CHOICE QUESTION MCQs

1. What will be the rest of the energy of an electron?
   (a) 0.41 MeV **(b) 0.51 MeV**
   (c) 0.61 MeV (d) 0.71 MeV
2. The mass of a positron is
   (a) a little less than the mass of an electron
   (b) exactly equal to the mass of an electron
   (c) greater than the mass of a proton
   (d) equal to the mass of a proton
3. The transformation of a neutron to a proton inside an atomic nucleus will **not**:
   (a) increase the atomic mass (b) increase the atomic number
   (a) happen by beta decay (d) release a lepton
4. Alpha decay
   (a) involves the emission of a neutrino
   (a) increases atomic number by one
   (c) changes the mass by about 4 atomic mass units
   (d) is how He burns to make ^{12}C
5. The equation represent actinium decaying to thorium

$$_{88}Ra^{226} \rightarrow _{86}Rn^{222} + Y$$

   Which particle does Y represent
   (a) A helium particle (b) An atom
   (c) An electron (d) A neutron
6. In which type of nuclear reaction are the nuclei heavier after the reaction than they were before?
   (a) α-decay **(b). β-decay**
   (c) γ-decay (d) Nuclear fusion
7. A $_{92}U^{236}$ nucleus will split when it captures
   (a) α-particle (b) a γ-ray
   (c) a neutron (d) a proton
8. Protons and neutrons are held together to form nuclei by the
   (a) gravitational interaction **(b) strong interaction**
   (c) weak interaction (d) electromagnetic interaction
9. If a U-238 nucleus splits into two identical parts, the two nuclei so produced will be
   (a) radioactive **(b) stable**
   (c) Isotope (d) Isobar
10. The carbon dating technique is used to estimate the age of
    (a) rocks (b) soil
    (c) fossils (d) buildings
11. The Charge on the α-particle is how many times the charge on the proton:
    (a) 4 times **(b) 2 times**
    (c) 3 times (d) equal
12. The half-life of a radioactive element is 30 days, then the remaining amount after 90 days:
    (a) 1/3 (b) 1/4
    (c) 1/8 (d) 1/16

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13 Which of the following nuclear fragments corresponding to nuclear fission between neutron $\mathbf{{}_{0}^{1}n}$ and the uranium $\mathbf{{}_{92}^{235}U}$ isotope is correct:

(a) ${}_{56}^{144}B_a + {}_{36}^{89}Kr + 4({}_{0}^{1}n)$

(b) ${}_{56}^{140}X_e + {}_{38}^{94}Sr + 3({}_{0}^{1}n)$

(c) ${}_{51}^{153}S_b + {}_{36}^{89}Kr + 3\,({}_{0}^{1}n)$

(d) ${}_{56}^{144}B_a + {}_{36}^{89}Kr + 3\,({}_{0}^{1}n)$

14 Atom bomb is based on the principle of

(a) Nuclear fusion **(b) Nuclear fission**

(c) Radioactivity (d) all of these

15 The main source of energy in the sun is

(a) nuclear fusion (b) nuclear fission

(b) chemical reaction (d) mechanical energy

16 The energy equivalent of 1 g of substance is:

(a) 1.6×10^{-19} J (b) 9×10^{-19} J

(c) 1.6×10^{9} J (d) 9×10^{13} J

17. From which of the following materials should a box for storing radioactive substances be made?

(a) Aluminum (b) Glass

(c) Graphite **(d) Lead**

18 In a nuclear reaction, there is the conservation of which of the following?

(a) Mass only (b) Energy only

(c) Momentum only **(d) Mass, energy, and momentum**

19 most stable isotope in nature is of

(a) iron 56 (b) carbon 12

(c) Uranium 236 (d) Uranium 238

20 The half-life of radium is 1600 years. After 6400 years, the sample of the surviving radium would be its:

(a) 1/4 (b) 1/8

(c) 1/16 (d) 1/2