

DPP

DAILY PRACTICE PROBLEMS

Class : XIIth

Date :

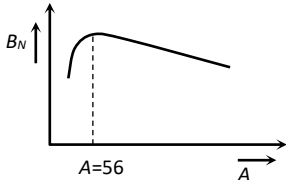
Subject : PHYSICS

DPP No. : 3

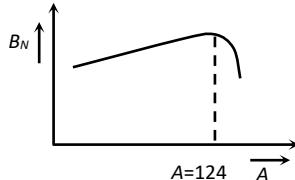
Topic :-Nuclei

- Consider α – Particles, β – Particles and γ – rays, each having an energy of 0.5 MeV. In increasing order of penetrating powers, the radiations are
 - α, β, γ
 - α, γ, β
 - β, γ, α
 - γ, β, α
- The dependence of binding energy per nucleon, B_N on the mass number, A , is represented by

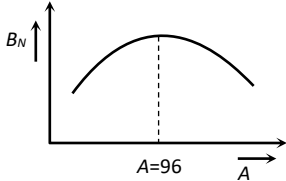
a)



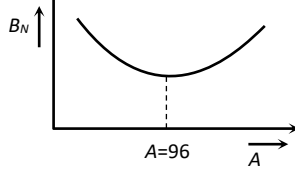
b)



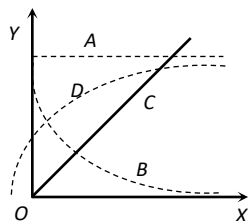
c)



d)


- A radioactive isotope has a half-life of T years. How long will it take the activity to reduce to 1% of its original value
 - $3.2T$ year
 - $4.6 T$ year
 - $6.6 T$ year
 - $9.2 T$ year
- An artificial radioactive decay series begins with unstable ${}_{94}^{241}\text{Pu}$. The stable nuclide obtained after eight α –decays and five β –decays is
 - ${}_{83}^{209}\text{Bi}$
 - ${}_{82}^{209}\text{Pb}$
 - ${}_{82}^{205}\text{Ti}$
 - ${}_{82}^{201}\text{Hg}$
- A radioactive sample S_1 having an activity of $5\mu\text{Ci}$ has twice the number of nuclei as another sample S_2 which has an activity of $10\mu\text{Ci}$. The half lives of S_1 and S_2 can be
 - 20 yr and 5 yr ,respectively
 - 20 yr and 10 yr ,respectively
 - 10 yr each
 - 5 yr each
- The rest mass of an electron as well as that of positron is 0.51 MeV . When an electron and positron are annihilate, they produce gamma-rays of wavelength(s)
 - $0.012\text{ \AA}$
 - $0.024\text{ \AA}$
 - $0.012\text{ \AA to } \infty$
 - $0.024\text{ \AA to } \infty$

7. In Fig. X represents time and Y represents activity of a radioactive sample. Then the activity of sample, varies with time according to the curve



- a) A b) B c) C d) D
8. In the Bohr model of the hydrogen atom, let R , v and E represent the radius of the orbit, the speed of electron and the total energy of the electron respectively. Which of the following quantity is proportional to the quantum number n
- a) R/E b) E/v c) RE d) uR
9. In Bohr's model of hydrogen atom, which of the following pairs of quantities are quantized
- a) Energy and linear momentum b) Linear and angular momentum
c) Energy and angular momentum d) None of the above
10. Two nucleons are at a separation of one fermi. Protons have a charge of $+1.6 \times 10^{-19}$ C. The net nuclear force between them is F_1 , if both are neutrons, F_2 if both are protons and F_3 if one is proton and the other is neutron. Then
- a) $F_1 = F_2 > F_3$ b) $F_1 = F_2 = F_3$ c) $F_1 < F_2 < F_3$ d) $F_1 > F_2 > F_3$
11. If r_1 and r_2 are the radii of the atomic nuclei of mass numbers 64 and 125 respectively, then the ratio (r_1/r_2) is
- a) $\frac{64}{125}$ b) $\sqrt{\frac{64}{125}}$ c) $\frac{5}{4}$ d) $\frac{4}{5}$
12. In a material medium, when a positron meets an electron both the particles annihilate leading to the emission of two gamma ray photons. This process forms the basis of an important diagnostic procedure called
- a) MRI b) PET c) CAT d) SPECT
13. If $\lambda_{\max}$ is $6563 \text{ \AA}$, then wavelength of second line for Balmer series will be
- a) $\lambda = \frac{16}{3R}$ b) $\lambda = \frac{36}{5R}$ c) $\lambda = \frac{4}{3R}$ d) None of the above
14. Rest mass energy of an electron is 0.54 MeV . If velocity of the electron is $0.8c$, then $K.E.$ of the electron is
- a) 0.36 MeV b) 0.41 MeV c) 0.48 MeV d) 1.32 MeV
15. If the binding energies of a deuteron and an alpha particle are 1.125 MeV and 7.2 MeV , respectively, then the more stable of the two is
- a) deuteron
b) Alpha-particle
c) Both (a) and (b)
d) Sometimes deuteron and Sometimes Alpha-particle
16. Consider the following two statements

- A. Energy spectrum of α -particles emitted in radioactive decay is discrete
B. Energy spectrum of β -particles emitted in radioactive decay is continuous
- a) Only A is correct
b) Only B is correct
c) A is correct but B is wrong
d) Both A and B are correct
17. Two radioactive materials X_1 and X_2 have decay constants 10λ and λ respectively. If initially, they have the same number of nuclei, then the ratio of the number of nuclei of X_1 to that of X_2 will be $1/e$ after a time
- a) $\frac{1}{10\lambda}$
b) $\frac{1}{11\lambda}$
c) $\frac{11}{10\lambda}$
d) $\frac{1}{9\lambda}$
18. If half life of radium is 77 days. Its decay constant in day will be
- a) $3 \times 10^{-13}/\text{day}$
b) $9 \times 10^{-3}/\text{day}$
c) $1 \times 10^{-3}/\text{day}$
d) $6 \times 10^{-3}/\text{day}$
19. Which of the following atoms has the lowest ionization potential
- a) ${}^8_{16}\text{O}$
b) ${}^{14}_7\text{N}$
c) ${}^{133}_{55}\text{Cs}$
d) ${}^{40}_{18}\text{Ar}$
20. Isobars are formed by
- a) α -decay
b) β -decay
c) γ -decay
d) h -decay