Q-Value of a Nuclear Reaction

1. Consider the following nuclear reaction :
$^{238}U \rightarrow {}^{234}Th + {}^{4}He$
Take masses of ^{238}U, ^{234}Th and ^{4}He as 238.050 u, 234.043 u and 4.003 u, respectively. The Q value for the reaction, in keV, is :
[Given : $1u = 931.5 MeVc^{-2}$]

(A) 3740 (B) 3726 (C) 3730 (D) 3736

NEET 2026

2. An unknown nucleus has a nuclear density of $2.29 \times 10^{17}\ kg/m^3$ and mass of 19.926×10^{-27} kg. Its mass number A is approximately : (Take $R_0 = 1.2 \times 10^{-15}$ m, $4\pi = 12.56$)

(A) 16 (B) 20 (C) 12 (D) 19

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3. Four statements are given (A is mass number) :
A. The volume of a nucleus is proportional to $A^{1/3}$.
B. The volume of a nucleus is proportional to A.
C. The difference in mass of an atom and its nucleus is called the mass defect.
D. The difference in mass of a nucleus and its constituents is called the mass defect.
Choose the correct answer from the options given below:

(A) A and D are true, but B and C are false

(B) B and D are true, but A and C are false

(C) B and C are true, but A and D are false

(D) A and C are true, but B and D are false

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4. $${}^{290}_{82}X \xrightarrow{\alpha} Y \xrightarrow{e^+} Z \xrightarrow{\beta^-} P \xrightarrow{e^-} Q$$
In the nuclear emission stated above, the mass number and atomic number of the product Q respectively, are

(A) 280, 81 (B) 286, 80 (C) 288, 82 (D) 286, 81

NEET 2024

5. A nucleus of mass number 189 splits into two nuclei having mass numbers 125 and 64. The ratio of radius of the two daughter nuclei respectively is

(A) 4 : 5 (B) 5 : 4 (C) 25 : 16 (D) 1 : 1

NEET 2022

6. A radioactive nucleus $^{A}_{z}X$ undergoes spontaneous decay in the sequence $^{A}_{Z}X \rightarrow_{Z-1} B \rightarrow_{Z-3} C \rightarrow_{Z-2} D$, where Z is the atomic number of element X. The possible decay particles in the sequence are:

(A) α, β^-, β^+ (B) α, β^+, β^-

(C) β^+, α, β^- (D) β, α, β^+

NEET 2

7. A nucleus with mass number 240 breaks into two ments each of mass number 120 , the binding per nu of unfragmented nuclei is 7.6 MeV while that of frag is 8.5 MeV . The total gain in the Binding Energy process is :

(A) 216 MeV (B) 0.9 MeV (C) 9.4 MeV (D) 804

NEET 2

8. The energy equivalent of 0.5 g of a substance is :

(A) 0.5×10^{13} J (B) 4.5×10^{16} J

(C) 4.5×10^{13} J (D) 1.5×10^{13} J

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9. If radius of the $_{13}Al^{27}$ Nucleus is taken to be R_{Al}, th radius $_{53}Te^{125}$ nucleus is nearly.

(A) $(\frac{53}{13})^{1/3} R_{Al}$

(B) $\frac{5}{3} R_{Al}$

(C) $\frac{3}{5} R_{Al}$

(D) $(\frac{13}{53})^{1/3} R_{Al}$

NEET 2

10. The binding energy per nucleon of $^{7}_{3}Li$ and $^{4}_{2}He$ nucl 5.60 MeV and 7.06 MeV, respectively. In the nucle action $^{7}_{3}Li + {}^{1}_{1}H \rightarrow {}^{4}_{2}He + Q$, the value of energy leased is:

(A) 19.6 MeV (B) -2.4 MeV (C) 8.4 MeV (D) 17.3

NEET 2

11. A certain mass of hydrogen is changed to Helium l process of fusion. The mass defect in fusion react 0.02866 u. The energy liberated per u is : (given 931MeV)

(A) 13.35 MeV (B) 2.67 MeV (C) 26.7 MeV (D) 6.67 MeV

NEET 2

12. If the nuclear radius of ^{27}Al is 3.6 Fermi, the approx nuclear radius of ^{64}Cu in Fermi is :

(A) 4.8 (B) 3.6 (C) 2.4 (D) 1.2

NEET 2