

PHYSICS · JEE MAIN

Nuclear Physics

Chapter-wise previous year questions, with answer key

91

PYQS

2020–2025

PAPERS

6

TOPICS

Nuclear Size and Density

Nuclear Fission

Radioactivity

Decay Law and Half-Life

Nuclear Fusion

Mass Defect and Binding Energy

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

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Nuclear Size and Density · 11 PYQs

Q1 JEE Main 2025 · 8 Apr · Shift 2

For a nucleus of mass number A and radius R , the mass density of nucleus can be represented as

- (A) $A^{\frac{2}{3}}$
- (B) Independent of A
- (C) A^3
- (D) $A^{\frac{1}{3}}$

Step-by-step solution ► [prepwiser.in/questions/F1ZiArgbkN](https://www.prepwiser.in/questions/F1ZiArgbkN)

Q2 JEE Main 2025 · 7 Apr · Shift 2

Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : The density of the copper (${}^{64}_{29}\text{Cu}$) nucleus is greater than that of the carbon (${}^{12}_6\text{C}$) nucleus.

Reason (R) : The nucleus of mass number A has a radius proportional to $A^{1/3}$.

In the light of the above statements, choose the **most appropriate answer** from the options given below :

- (A) (A) is correct but (R) is not correct
- (B) Both (A) and (R) are correct but (R) is **not** the correct explanation of (A)
- (C) (A) is not correct but (R) is correct
- (D) Both (A) and (R) are correct and (R) **is** the correct explanation of (A)

Step-by-step solution ► [prepwiser.in/questions/7m71ItalcU](https://www.prepwiser.in/questions/7m71ItalcU)

Q3 JEE Main 2024 · 1 Feb · Shift 1

The radius of a nucleus of mass number 64 is 4.8 fermi. Then the mass number of another nucleus having radius of 4 fermi is $\frac{1000}{x}$, where x is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/khYs6HzoWf](https://www.prepwiser.in/questions/khYs6HzoWf)

Q4 JEE Main 2024 · 31 Jan · Shift 2

A nucleus has mass number A_1 and volume V_1 . Another nucleus has mass number A_2 and Volume V_2 . If relation between mass number is $A_2 = 4A_1$, then $\frac{V_2}{V_1} = \underline{\hspace{2cm}}$.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/it2ZbFLWiD](https://www.prepwiser.in/questions/it2ZbFLWiD)

Q5 JEE Main 2024 · 31 Jan · Shift 2

The mass number of nucleus having radius equal to half of the radius of nucleus with mass number 192 is :

- (A) 32
- (B) 24
- (C) 20
- (D) 40

Step-by-step solution ► [prepwiser.in/questions/Eok9uGrpKH](https://www.prepwiser.in/questions/Eok9uGrpKH)

Q6 JEE Main 2023 · 30 Jan · Shift 2

Given below are two statements: one is labelled as Assertion **A** and the other is labelled as Reason **R**

Assertion A: The nuclear density of nuclides ${}^{10}_5\text{B}$, ${}^6_3\text{Li}$, ${}^{56}_{26}\text{Fe}$, ${}^{20}_{10}\text{Ne}$ and ${}^{209}_{83}\text{Bi}$ can be arranged as $\rho_{\text{Bi}}^{\text{N}} > \rho_{\text{Fe}}^{\text{N}} > \rho_{\text{Ne}}^{\text{N}} > \rho_{\text{B}}^{\text{N}} > \rho_{\text{Li}}^{\text{N}}$

Reason R: The radius R of nucleus is related to its mass number A as $R = R_0 A^{1/3}$, where R_0 is a constant.

In the light of the above statements, choose the correct answer from the options given below

- (A) Both **A** and **R** are true and **R** is the correct explanation of **A**
- (B) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**
- (C) **A** is false but **R** is true
- (D) **A** is true but **R** is false

[Step-by-step solution ► prepwisser.in/questions/lzkWj_6PsX](https://www.prepwisser.in/questions/lzkWj_6PsX)

Q7 JEE Main 2023 · 25 Jan · Shift 1

The ratio of the density of oxygen nucleus (${}^{16}_8\text{O}$) and helium nucleus (${}^4_2\text{He}$) is

- (A) 4 : 1
- (B) 1 : 1
- (C) 2 : 1
- (D) 8 : 1

[Step-by-step solution ► prepwisser.in/questions/7MljmzMlpb](https://www.prepwisser.in/questions/7MljmzMlpb)

Q8 JEE Main 2023 · 24 Jan · Shift 1

Assume that protons and neutrons have equal masses. Mass of a nucleon is 1.6×10^{-27} kg and radius of nucleus is $1.5 \times 10^{-15} \text{ A}^{1/3} \text{ m}$. The approximate ratio of the nuclear density and water density is $n \times 10^{13}$. The value of n is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/UhSOBUA0i7](https://www.prepwisser.in/questions/UhSOBUA0i7)

Q9 JEE Main 2022 · 29 Jul · Shift 2

Read the following statements :

- (A) Volume of the nucleus is directly proportional to the mass number.
- (B) Volume of the nucleus is independent of mass number.
- (C) Density of the nucleus is directly proportional to the mass number.
- (D) Density of the nucleus is directly proportional to the cube root of the mass number.
- (E) Density of the nucleus is independent of the mass number.

Choose the correct option from the following options.

- (A) (A) and (D) only.
- (B) (A) and (E) only.
- (C) (B) and (E) only.
- (D) (A) and (C) only.

[Step-by-step solution ► prepwisser.in/questions/O6CRV2P84L](https://www.prepwisser.in/questions/O6CRV2P84L)

Q10 JEE Main 2022 · 26 Jul · Shift 2

Mass numbers of two nuclei are in the ratio of 4 : 3. Their nuclear densities will be in the ratio of

- (A) 4 : 3 (B) $\left(\frac{3}{4}\right)^{\frac{1}{3}}$
(C) 1 : 1 (D) $\left(\frac{4}{3}\right)^{\frac{1}{3}}$

[Step-by-step solution ► prepwiser.in/questions/-b3chPBOeg](https://www.prepwiser.in/questions/-b3chPBOeg)

Q11 JEE Main 2020 · 3 Sep · Shift 2

The radius R of a nucleus of mass number A can be estimated by the formula

$$R = (1.3 \times 10^{-15})A^{1/3} \text{ m.}$$

It follows that the mass density of a nucleus is of the order of :

$$(M_{\text{prot.}} \cong M_{\text{neut}} \cong 1.67 \times 10^{-27} \text{ kg})$$

- (A) $10^{24} \text{ kg m}^{-3}$
(B) $10^{10} \text{ kg m}^{-3}$
(C) $10^{17} \text{ kg m}^{-3}$
(D) 10^3 kg m^{-3}

[Step-by-step solution ► prepwiser.in/questions/ZUmwoWThcl](https://www.prepwiser.in/questions/ZUmwoWThcl)

Nuclear Fission · 8 PYQs

Q12 JEE Main 2024 · 8 Apr · Shift 2

In a hypothetical fission reaction



The identity of emitted particles (R) is :

- (A) Proton (B) Neutron
(C) Electron (D) γ -radiations

[Step-by-step solution ► prepwiser.in/questions/o1LJMfYu8U](https://www.prepwiser.in/questions/o1LJMfYu8U)

Q13 JEE Main 2024 · 4 Apr · Shift 1

Which of the following nuclear fragments corresponding to nuclear fission between neutron (${}_0^1\text{n}$) and uranium isotope (${}_{92}^{235}\text{U}$) is correct :

- (A) ${}_{56}^{140}\text{Xe} + {}_{38}^{94}\text{Sr} + 3{}_0^1\text{n}$
(B) ${}_{51}^{153}\text{Sb} + {}_{41}^{99}\text{Nb} + 3{}_0^1\text{n}$
(C) ${}_{56}^{144}\text{Ba} + {}_{36}^{89}\text{Kr} + 4{}_0^1\text{n}$
(D) ${}_{56}^{144}\text{Ba} + {}_{36}^{89}\text{Kr} + 3{}_0^1\text{n}$

[Step-by-step solution ► prepwiser.in/questions/pj--gfxhfp](https://www.prepwiser.in/questions/pj--gfxhfp)

Q14 JEE Main 2024 · 30 Jan · Shift 2

In a nuclear fission reaction of an isotope of mass M , three similar daughter nuclei of same mass are formed. The speed of a daughter nuclei in terms of mass defect ΔM will be :

(A) $c\sqrt{\frac{3\Delta M}{M}}$

(B) $\frac{\Delta Mc^2}{3}$

(C) $c\sqrt{\frac{2\Delta M}{M}}$

(D) $\sqrt{\frac{2c\Delta M}{M}}$

Step-by-step solution ► [prepwiser.in/questions/fWO_GnOfRW](https://www.prepwiser.in/questions/fWO_GnOfRW)

Q15 JEE Main 2023 · 11 Apr · Shift 2

A nucleus disintegrates into two nuclear parts, in such a way that ratio of their nuclear sizes is $1 : 2^{1/3}$. Their respective speed have a ratio of $n : 1$. The value of n is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/c1xdw-YfLm](https://www.prepwiser.in/questions/c1xdw-YfLm)

Q16 JEE Main 2023 · 24 Jan · Shift 2

The energy released per fission of nucleus of ^{240}X is 200 MeV. The energy released if all the atoms in 120g of pure ^{240}X undergo fission is _____ $\times 10^{25}$ MeV.

(Given $N_A = 6 \times 10^{23}$)

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/Tshx1LiDIS](https://www.prepwiser.in/questions/Tshx1LiDIS)

Q17 JEE Main 2022 · 26 Jul · Shift 2

A nucleus of mass M at rest splits into two parts having masses $\frac{M'}{3}$ and $\frac{2M'}{3}$ ($M' < M$). The ratio of de Broglie wavelength of two parts will be :

(A) $1 : 2$

(B) $2 : 1$

(C) $1 : 1$

(D) $2 : 3$

Step-by-step solution ► [prepwiser.in/questions/8qFw5HbORA](https://www.prepwiser.in/questions/8qFw5HbORA)

Q18 JEE Main 2022 · 24 Jun · Shift 1

Nucleus A is having mass number 220 and its binding energy per nucleon is 5.6 MeV. It splits in two fragments 'B' and 'C' of mass numbers 105 and 115. The binding energy of nucleons in 'B' and 'C' is 6.4 MeV per nucleon. The energy Q released per fission will be :

(A) 0.8 MeV

(B) 275 MeV

(C) 220 MeV

(D) 176 MeV

Step-by-step solution ► [prepwiser.in/questions/II_knQnPh4](https://www.prepwiser.in/questions/II_knQnPh4)

Q19 JEE Main 2020 · 2 Sep · Shift 1

In a reactor, 2 kg of ^{235}U fuel is fully used up in 30 days. The energy released per fission is 200 MeV. Given that the Avogadro number, $N = 6.023 \times 10^{26}$ per kilo mole and $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$. The power output of the reactor is close to

(A) 125 MW

(B) 60 MW

(C) 54 MW

(D) 35 MW

Step-by-step solution ► [prepwiser.in/questions/JyNrifK_r-](https://www.prepwiser.in/questions/JyNrifK_r-)

Q20 JEE Main 2023 · 12 Apr · Shift 1

A common example of alpha decay is



Given :

$${}_{92}^{238}\text{U} = 238.05060\text{u},$$

$${}_{90}^{234}\text{Th} = 234.04360\text{u},$$

$${}_2^4\text{He} = 4.00260\text{u} \text{ and}$$

$$1\text{u} = 931.5 \frac{\text{MeV}}{c^2}$$

The energy released (Q) during the alpha decay of ${}_{92}^{238}\text{U}$ is _____ MeV

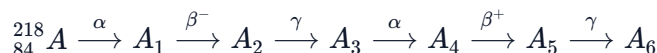
Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/pvv4an77-4](https://www.prepwisar.in/questions/pvv4an77-4)**Q21** JEE Main 2023 · 29 Jan · Shift 1A radioactive element ${}_{92}^{242}\text{X}$ emits two α -particles, one electron and two positrons. The product nucleus is represented by ${}_P^{234}\text{Y}$. The value of P is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/sBPtL8Pev6](https://www.prepwisar.in/questions/sBPtL8Pev6)**Q22** JEE Main 2023 · 24 Jan · Shift 1

Consider the following radioactive decay process

The mass number and the atomic number of A_6 are given by :**(A)** 210 and 84**(B)** 210 and 80**(C)** 211 and 80**(D)** 210 and 82[Step-by-step solution ► prepwisar.in/questions/thl9jXKMkV](https://www.prepwisar.in/questions/thl9jXKMkV)**Q23** JEE Main 2022 · 29 Jun · Shift 2

In the following nuclear reaction,

Mass number of D is 182 and atomic number is 74. Mass number and atomic number of D_4 respectively will be _____.**(A)** 174 and 71**(B)** 174 and 69**(C)** 172 and 69**(D)** 172 and 71[Step-by-step solution ► prepwisar.in/questions/qHQVZiPPVN](https://www.prepwisar.in/questions/qHQVZiPPVN)

Q24 JEE Main 2022 · 26 Jun · Shift 1

How many alpha and beta particles are emitted when Uranium ${}_{92}\text{U}^{238}$ decays to lead ${}_{82}\text{Pb}^{206}$?

- (A) 3 alpha particles and 5 beta particles (B) 6 alpha particles and 4 beta particles
(C) 4 alpha particles and 5 beta particles (D) 8 alpha particles and 6 beta particles

[Step-by-step solution ► prepwisser.in/questions/eikbNWTmBI](https://www.prepwisser.in/questions/eikbNWTmBI)

Q25 JEE Main 2021 · 27 Jul · Shift 2

Consider the following statements :

- A. Atoms of each element emit characteristics spectrum.
B. According to Bohr's Postulate, an electron in a hydrogen atom, revolves in a certain stationary orbit.
C. The density of nuclear matter depends on the size of the nucleus.
D. A free neutron is stable but a free proton decay is possible.
E. Radioactivity is an indication of the instability of nuclei.

Choose the correct answer from the options given below :

- (A) A, B, C, D and E (B) A, B and E only
(C) B and D only (D) A, C and E only

[Step-by-step solution ► prepwisser.in/questions/sNX7aWHY9i](https://www.prepwisser.in/questions/sNX7aWHY9i)

Q26 JEE Main 2021 · 22 Jul · Shift 2

A nucleus with mass number 184 initially at rest emits an α -particle. If the Q value of the reaction is 5.5 MeV, calculate the kinetic energy of the α -particle.

- (A) 5.5 MeV (B) 5.0 MeV
(C) 5.38 MeV (D) 0.12 MeV

[Step-by-step solution ► prepwisser.in/questions/LAOJGssy_j](https://www.prepwisser.in/questions/LAOJGssy_j)

Q27 JEE Main 2021 · 20 Jul · Shift 1

A nucleus of mass M emits γ -ray photon of frequency ' ν '. The loss of internal energy by the nucleus is :

[Take 'c' as the speed of electromagnetic wave]

- (A) $h\nu$
(B) $h\nu \left[1 + \frac{h\nu}{2Mc^2} \right]$
(C) $h\nu \left[1 - \frac{h\nu}{2Mc^2} \right]$
(D) 0

[Step-by-step solution ► prepwisser.in/questions/seEw78C7hY](https://www.prepwisser.in/questions/seEw78C7hY)

Q28 JEE Main 2021 · 18 Mar · Shift 2

The decay of a proton to neutron is :

- (A) always possible as it is associated only with β^+ decay
- (B) possible only inside the nucleus
- (C) not possible as proton mass is less than the neutron mass
- (D) not possible but neutron to proton conversion is possible

[Step-by-step solution](https://www.prepwiser.in/questions/JWUKwrakYk) ► [prepwiser.in/questions/JWUKwrakYk](https://www.prepwiser.in/questions/JWUKwrakYk)

Decay Law and Half-Life · 36 PYQs

Q29 JEE Main 2025 · 23 Jan · Shift 1

A radioactive nucleus n_2 has 3 times the decay constant as compared to the decay constant of another radioactive nucleus n_1 . If initial number of both nuclei are the same, what is the ratio of number of nuclei of n_2 to the number of nuclei of n_1 , after one half-life of n_1 ?

- (A) $1/4$
- (B) $1/8$
- (C) 4
- (D) 8

[Step-by-step solution](https://www.prepwiser.in/questions/HYjFQ-104g) ► [prepwiser.in/questions/HYjFQ-104g](https://www.prepwiser.in/questions/HYjFQ-104g)

Q30 JEE Main 2023 · 15 Apr · Shift 1

The half-life of a radioactive nucleus is 5 years. The fraction of the original sample that would decay in 15 years is:

- (A) $\frac{1}{8}$
- (B) $\frac{3}{4}$
- (C) $\frac{7}{8}$
- (D) $\frac{1}{4}$

[Step-by-step solution](https://www.prepwiser.in/questions/y63SGOD7C8) ► [prepwiser.in/questions/y63SGOD7C8](https://www.prepwiser.in/questions/y63SGOD7C8)

Q31 JEE Main 2023 · 11 Apr · Shift 1

Two radioactive elements A and B initially have same number of atoms. The half life of A is same as the average life of B. If λ_A and λ_B are decay constants of A and B respectively, then choose the correct relation from the given options.

- (A) $\lambda_A = \lambda_B \ln 2$
- (B) $\lambda_A \ln 2 = \lambda_B$
- (C) $\lambda_A = 2\lambda_B$
- (D) $\lambda_A = \lambda_B$

[Step-by-step solution](https://www.prepwiser.in/questions/TARTffF8nj) ► [prepwiser.in/questions/TARTffF8nj](https://www.prepwiser.in/questions/TARTffF8nj)

Q32 JEE Main 2023 · 10 Apr · Shift 2

The half life of a radioactive substance is T. The time taken, for disintegrating $\frac{7}{8}$ th part of its original mass will be:

- (A) 8T
- (B) 3T
- (C) T
- (D) 2T

[Step-by-step solution](https://www.prepwiser.in/questions/PLI-2HzLEQ) ► [prepwiser.in/questions/PLI-2HzLEQ](https://www.prepwiser.in/questions/PLI-2HzLEQ)

Q33 JEE Main 2023 · 10 Apr · Shift 1

The decay constant for a radioactive nuclide is $1.5 \times 10^{-5} \text{ s}^{-1}$. Atomic weight of the substance is 60 g mole⁻¹, ($N_A = 6 \times 10^{23}$). The activity of 1.0 μg of the substance is _____ $\times 10^{10}$ Bq.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/p8K1t4lZP6](https://www.prepwiser.in/questions/p8K1t4lZP6)

Q34 JEE Main 2023 · 8 Apr · Shift 2

A radio active material is reduced to $1/8$ of its original amount in 3 days. If $8 \times 10^{-3} \text{ kg}$ of the material is left after 5 days the initial amount of the material is

- (A) 64 g (B) 256 g
(C) 32 g (D) 40 g

[Step-by-step solution ► prepwiser.in/questions/DPKrSdBe8f](https://www.prepwiser.in/questions/DPKrSdBe8f)

Q35 JEE Main 2023 · 30 Jan · Shift 2

A radioactive nucleus decays by two different process. The half life of the first process is 5 minutes and that of the second process is 30s. The effective half-life of the nucleus is calculated to be $\frac{\alpha}{11}$ s. The value of α is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/b5H8uRk0hn](https://www.prepwiser.in/questions/b5H8uRk0hn)

Q36 JEE Main 2023 · 29 Jan · Shift 1

If a radioactive element having half-life of 30min is undergoing beta decay, the fraction of radioactive element remains undecayed after 90min. will be

- (A) $\frac{1}{16}$ (B) $\frac{1}{4}$
(C) $\frac{1}{8}$ (D) $\frac{1}{2}$

[Step-by-step solution ► prepwiser.in/questions/AtVn9IOCC-](https://www.prepwiser.in/questions/AtVn9IOCC-)

Q37 JEE Main 2023 · 29 Jan · Shift 2

Substance A has atomic mass number 16 and half life of 1 day. Another substance B has atomic mass number 32 and half life of $\frac{1}{2}$ day. If both A and B simultaneously start undergo radio activity at the same time with initial mass 320 g each, how many total atoms of A and B combined would be left after 2 days.

- (A) 1.69×10^{24} (B) 3.38×10^{24}
(C) 6.76×10^{23} (D) 6.76×10^{24}

[Step-by-step solution ► prepwiser.in/questions/kq-nyfM_N5](https://www.prepwiser.in/questions/kq-nyfM_N5)

Q38 JEE Main 2022 · 29 Jul · Shift 2

Two radioactive materials A and B have decay constants 25λ and 16λ respectively. If initially they have the same number of nuclei, then the ratio of the number of nuclei of B to that of A will be "e" after a time $\frac{1}{a\lambda}$. The value of a is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/-aqBmIxEl5](https://www.prepwiser.in/questions/-aqBmIxEl5)

Q39 JEE Main 2022 · 28 Jul · Shift 2

A radioactive sample decays $\frac{7}{8}$ times its original quantity in 15 minutes. The half-life of the sample is

- (A) 5 min (B) 7.5 min
(C) 15 min (D) 30 min

[Step-by-step solution ► prepwiser.in/questions/QkmH2pUbOZ](https://www.prepwiser.in/questions/QkmH2pUbOZ)

Q40 JEE Main 2022 · 28 Jul · Shift 1

The half life period of a radioactive substance is 60 days. The time taken for $\frac{7}{8}$ th of its original mass to disintegrate will be :

- (A) 120 days (B) 130 days
(C) 180 days (D) 20 days

[Step-by-step solution ► prepwiser.in/questions/hDyhM3x9d2](https://www.prepwiser.in/questions/hDyhM3x9d2)

Q41 JEE Main 2022 · 28 Jul · Shift 1

A freshly prepared radioactive source of half life 2 hours 30 minutes emits radiation which is 64 times the permissible safe level. The minimum time, after which it would be possible to work safely with source, will be _____ hours.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/QnwkmLD-3L](https://www.prepwiser.in/questions/QnwkmLD-3L)

Q42 JEE Main 2022 · 27 Jul · Shift 2

The activity of a radioactive material is 6.4×10^{-4} curie. Its half life is 5 days. The activity will become 5×10^{-6} curie after :

- (A) 7 days (B) 15 days
(C) 25 days (D) 35 days

[Step-by-step solution ► prepwiser.in/questions/zd_p2QyDWI](https://www.prepwiser.in/questions/zd_p2QyDWI)

Q43 JEE Main 2022 · 27 Jul · Shift 1

What is the half-life period of a radioactive material if its activity drops to $1/16^{\text{th}}$ of its initial value in 30 years?

- (A) 9.5 years (B) 8.5 years
(C) 7.5 years (D) 10.5 years

[Step-by-step solution ► prepwiser.in/questions/oVuUlemPWg](https://www.prepwiser.in/questions/oVuUlemPWg)

Q44 JEE Main 2022 · 26 Jul · Shift 1

The disintegration rate of a certain radioactive sample at any instant is 4250 disintegrations per minute. 10 minutes later, the rate becomes 2250 disintegrations per minute. The approximate decay constant is :
(Take $\log_{10} 1.88 = 0.274$)

- (A) 0.02 min^{-1} (B) 2.7 min^{-1}
(C) 0.063 min^{-1} (D) 6.3 min^{-1}

[Step-by-step solution ► prepwiser.in/questions/abpjom7LwZ](https://www.prepwiser.in/questions/abpjom7LwZ)

Q45 JEE Main 2022 · 29 Jun · Shift 2

The half life of a radioactive substance is 5 years. After x years a given sample of the radioactive substance gets reduced to 6.25% of its initial value. The value of x is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/pEMwvxqStq](https://www.prepwiser.in/questions/pEMwvxqStq)

Q46 JEE Main 2022 · 29 Jun · Shift 1

The activity of a radioactive material is 2.56×10^{-3} Ci. If the half life of the material is 5 days, after how many days the activity will become 2×10^{-5} Ci ?

(A) 30 days

(B) 35 days

(C) 40 days

(D) 25 days

[Step-by-step solution ► prepwiser.in/questions/nbcr7jGGBP](https://www.prepwiser.in/questions/nbcr7jGGBP)

Q47 JEE Main 2022 · 28 Jun · Shift 2

Following statements related to radioactivity are given below :

(A) Radioactivity is a random and spontaneous process and is dependent on physical and chemical conditions.

(B) The number of un-decayed nuclei in the radioactive sample decays exponentially with time.

(C) Slope of the graph of $\log_e$ (no. of undecayed nuclei) Vs. time represents the reciprocal of mean life time (τ).

(D) Product of decay constant (λ) and half-life time ($T_{1/2}$) is not constant.

Choose the most appropriate answer from the options given below :

(A) (A) and (B) only

(B) (B) and (D) only

(C) (B) and (C) only

(D) (C) and (D) only

[Step-by-step solution ► prepwiser.in/questions/LbzFbiaUHL](https://www.prepwiser.in/questions/LbzFbiaUHL)

Q48 JEE Main 2022 · 24 Jun · Shift 2

A sample contains 10^{-2} kg each of two substances A and B with half lives 4 s and 8 s respectively. The ratio of their atomic weights is 1 : 2. The ratio of the amounts of A and B after 16 s is $\frac{x}{100}$. The value of x is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/hAlxozKOI3](https://www.prepwiser.in/questions/hAlxozKOI3)

Q49 JEE Main 2021 · 1 Sep · Shift 2

The half life period of radioactive element x is same as the mean life time of another radioactive element y . Initially they have the same number of atoms. Then :

(A) x -will decay faster than y .

(B) y -will decay faster than x .

(C) x and y have same decay rate initially and later on different decay rate.

(D) x and y decay at the same rate always.

[Step-by-step solution ► prepwiser.in/questions/oJDOTY04R5](https://www.prepwiser.in/questions/oJDOTY04R5)

Q50 JEE Main 2021 · 27 Aug · Shift 1

There are 10^{10} radioactive nuclei in a given radioactive element, its half-life time is 1 minute. How many nuclei will remain after 30 seconds? ($\sqrt{2} = 1.414$)

- (A) 2×10^{10}
- (B) 7×10^9
- (C) 10^5
- (D) 4×10^{10}

[Step-by-step solution ► prepwiser.in/questions/I9qMlk4pUI](https://www.prepwiser.in/questions/I9qMlk4pUI)

Q51 JEE Main 2021 · 27 Jul · Shift 1

A radioactive sample has an average life of 30 ms and is decaying. A capacitor of capacitance $200 \mu\text{F}$ is first charged and later connected with resistor 'R'. If the ratio of charge on capacitor to the activity of radioactive sample is fixed with respect to time then the value of 'R' should be _____ Ω .

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/fLqoE9HNTc](https://www.prepwiser.in/questions/fLqoE9HNTc)

Q52 JEE Main 2021 · 27 Jul · Shift 1

If 'f' denotes the ratio of the number of nuclei decayed (N_d) to the number of nuclei at $t = 0$ (N_0) then for a collection of radioactive nuclei, the rate of change of 'f' with respect to time is given as :

[λ is the radioactive decay constant]

- (A) $-\lambda(1 - e^{-\lambda t})$
- (B) $\lambda(1 - e^{-\lambda t})$
- (C) $\lambda e^{-\lambda t}$
- (D) $-\lambda e^{-\lambda t}$

[Step-by-step solution ► prepwiser.in/questions/9dGJ0b5onS](https://www.prepwiser.in/questions/9dGJ0b5onS)

Q53 JEE Main 2021 · 25 Jul · Shift 2

The nuclear activity of a radioactive element becomes $\left(\frac{1}{8}\right)^{th}$ of its initial value in 30 years. The half-life of radioactive element is _____ years.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/2ml-q9N2G2](https://www.prepwiser.in/questions/2ml-q9N2G2)

Q54 JEE Main 2021 · 25 Jul · Shift 1

Some nuclei of a radioactive material are undergoing radioactive decay. The time gap between the instances when a quarter of the nuclei have decayed and when half of the nuclei have decayed is given as :

(where λ is the decay constant)

- (A) $\frac{1}{2} \frac{\ln 2}{\lambda}$
- (B) $\frac{\ln 2}{\lambda}$
- (C) $\frac{2 \ln 2}{\lambda}$
- (D) $\frac{\ln 3}{\lambda}$

[Step-by-step solution ► prepwiser.in/questions/nYIF2OhOnt](https://www.prepwiser.in/questions/nYIF2OhOnt)

Q55 JEE Main 2021 · 25 Jul · Shift 1

The half-life of ^{198}Au is 3 days. If atomic weight of ^{198}Au is 198 g/mol then the activity of 2 mg of ^{198}Au is [in disintegration/second] :

- (A) 2.67×10^{12}
- (B) 6.06×10^{18}
- (C) 32.36×10^{12}
- (D) 16.18×10^{12}

Step-by-step solution ► [prepwiser.in/questions/9Iazhd9P99](https://www.prepwiser.in/questions/9Iazhd9P99)

Q56 JEE Main 2021 · 20 Jul · Shift 2

A radioactive substance decays to $\left(\frac{1}{16}\right)^{th}$ of its initial activity in 80 days. The half life of the radioactive substance expressed in days is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/YU1VaZlqfV](https://www.prepwiser.in/questions/YU1VaZlqfV)

Q57 JEE Main 2021 · 18 Mar · Shift 1

A radioactive sample disintegrates via two independent decay processes having half lives $T_{1/2}^{(1)}$ and $T_{1/2}^{(2)}$ respectively. The effective half-life $T_{1/2}$ of the nuclei is :

(A) None of the above

(B) $T_{1/2} = T_{1/2}^{(1)} + T_{1/2}^{(2)}$

(C) $T_{1/2} = \frac{T_{1/2}^{(1)} T_{1/2}^{(2)}}{T_{1/2}^{(1)} + T_{1/2}^{(2)}}$

(D) $T_{1/2} = \frac{T_{1/2}^{(1)} + T_{1/2}^{(2)}}{T_{1/2}^{(1)} - T_{1/2}^{(2)}}$

Step-by-step solution ► [prepwiser.in/questions/FcRDN_8s0T](https://www.prepwiser.in/questions/FcRDN_8s0T)

Q58 JEE Main 2021 · 16 Mar · Shift 2

Calculate the time interval between 33% decay and 67% decay if half-life of a substance is 20 minutes.

- (A) 40 minutes
- (B) 60 minutes
- (C) 13 minutes
- (D) 20 minutes

Step-by-step solution ► [prepwiser.in/questions/cs7wAl3bCD](https://www.prepwiser.in/questions/cs7wAl3bCD)

Q59 JEE Main 2021 · 16 Mar · Shift 2

The half-life of Au^{198} is 2.7 days. The activity of 1.50 mg of Au^{198} if its atomic weight is 198 g mol⁻¹ is, ($N_a = 6 \times 10^{23}$ /mol).

- (A) 240 Ci
- (B) 357 Ci
- (C) 252 Ci
- (D) 535 Ci

Step-by-step solution ► [prepwiser.in/questions/iLY9toRh8d](https://www.prepwiser.in/questions/iLY9toRh8d)

Q60 JEE Main 2021 · 26 Feb · Shift 2

A radioactive sample is undergoing α decay. At any time t_1 , its activity is A and another time t_2 , the activity is $\frac{A}{5}$. What is the average life time for the sample?

- (A) $\frac{\ln 5}{t_2 - t_1}$ (B) $\frac{\ln(t_2 + t_1)}{2}$
(C) $\frac{t_1 - t_2}{\ln 5}$ (D) $\frac{t_2 - t_1}{\ln 5}$

Step-by-step solution ► [prepwiser.in/questions/5aHlMmOBwe](https://www.prepwiser.in/questions/5aHlMmOBwe)

Q61 JEE Main 2021 · 25 Feb · Shift 1

Two radioactive substances X and Y originally have N_1 and N_2 nuclei respectively. Half life of X is half of the half life of Y. After three half lives of Y, number of nuclei of both are equal. The ratio $\frac{N_1}{N_2}$ will be equal to :

- (A) $\frac{1}{8}$ (B) $\frac{3}{1}$
(C) $\frac{1}{3}$ (D) $\frac{8}{1}$

Step-by-step solution ► [prepwiser.in/questions/rvEbvJjy6j](https://www.prepwiser.in/questions/rvEbvJjy6j)

Q62 JEE Main 2020 · 5 Sep · Shift 2

A radioactive nucleus decays by two different processes. The half life for the first process is 10 s and that for the second is 100 s. The effective half life of the nucleus is close to :

- (A) 12 sec (B) 9 sec
(C) 55 sec (D) 6 sec

Step-by-step solution ► [prepwiser.in/questions/mwaoGde5k9](https://www.prepwiser.in/questions/mwaoGde5k9)

Q63 JEE Main 2020 · 3 Sep · Shift 1

In a radioactive material, fraction of active material remaining after time t is $9/16$. The fraction that was remaining after $t/2$ is

- (A) $\frac{3}{4}$ (B) $\frac{4}{5}$
(C) $\frac{3}{5}$ (D) $\frac{7}{8}$

Step-by-step solution ► [prepwiser.in/questions/K9bmIpDymi](https://www.prepwiser.in/questions/K9bmIpDymi)

Q64 JEE Main 2020 · 7 Jan · Shift 2

The activity of a radioactive sample falls from 700 s^{-1} to 500 s^{-1} in 30 minutes. Its half life is close to:

- (A) 62 min (B) 66 min
(C) 72 min (D) 52 min

Step-by-step solution ► [prepwiser.in/questions/dAEpSrnfQfe](https://www.prepwiser.in/questions/dAEpSrnfQfe)

Q65 JEE Main 2024 · 9 Apr · Shift 1

A star has 100% helium composition. It starts to convert three ${}^4\text{He}$ into one ${}^{12}\text{C}$ via triple alpha process as



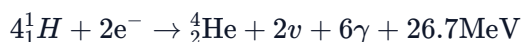
. The mass of the star is $2.0 \times 10^{32}\text{kg}$ and it generates energy at the rate of $5.808 \times 10^{30}\text{W}$. The rate of converting these ${}^4\text{He}$ to ${}^{12}\text{C}$ is $n \times 10^{42}\text{s}^{-1}$, where n is _____. [Take, mass of ${}^4\text{He} = 4.0026\text{u}$, mass of ${}^{12}\text{C} = 12\text{u}$]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/PDWZ-IbuPE](https://www.prepwiser.in/questions/PDWZ-IbuPE)

Q66 JEE Main 2024 · 9 Apr · Shift 2

The energy released in the fusion of 2kg of hydrogen deep in the sun is E_H and the energy released in the fission of 2kg of ${}^{235}\text{U}$ is E_U . The ratio $\frac{E_H}{E_U}$ is approximately: (Consider the fusion reaction as



, energy released in the fission reaction of ${}^{235}\text{U}$ is 200MeV per fission nucleus and $N_A = 6.023 \times 10^{23}$)

(A) 7.62

(B) 25.6

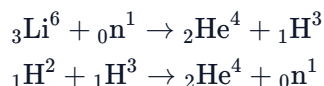
(C) 9.13

(D) 15.04

[Step-by-step solution ► prepwiser.in/questions/s3pnDMFLX3](https://www.prepwiser.in/questions/s3pnDMFLX3)

Q67 JEE Main 2024 · 29 Jan · Shift 1

The explosive in a Hydrogen bomb is a mixture of ${}_1\text{H}^2$, ${}_1\text{H}^3$ and ${}_3\text{Li}^6$ in some condensed form. The chain reaction is given by



During the explosion the energy released is approximately

[Given ;

$$M(\text{Li}) = 6.01690\text{amu}, M({}_1\text{H}^2) = 2.01471\text{amu}, M({}_2\text{He}^4) = 4.00388$$

amu, and $1\text{amu} = 931.5\text{MeV}$]

(A) 22.22 MeV

(B) 28.12 MeV

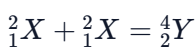
(C) 16.48 MeV

(D) 12.64 MeV

[Step-by-step solution ► prepwiser.in/questions/860xCh0if9](https://www.prepwiser.in/questions/860xCh0if9)

Q68 JEE Main 2022 · 26 Jul · Shift 2

Two lighter nuclei combine to form a comparatively heavier nucleus by the relation given below :



The binding energies per nucleon for ${}_1^2\text{X}$ and ${}_2^4\text{Y}$ are 1.1 MeV and 7.6 MeV respectively. The energy released in this process is _____ MeV.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/TudFujk_BN](https://www.prepwiser.in/questions/TudFujk_BN)

Mass Defect and Binding Energy · 23 PYQs

Q69 JEE Main 2025 · 2 Apr · Shift 2

Energy released when two deuterons (${}_1\text{H}^2$) fuse to form a helium nucleus (${}_2\text{He}^4$) is : (Given : Binding energy per nucleon of ${}_1\text{H}^2 = 1.1\text{MeV}$ and binding energy per nucleon of ${}_2\text{He}^4 = 7.0\text{MeV}$)

(A) 26.8 MeV

(B) 8.1 MeV

(C) 23.6 MeV

(D) 5.9 MeV

[Step-by-step solution ► prepwiser.in/questions/aVFW5VUIaX](https://www.prepwiser.in/questions/aVFW5VUIaX)

Q70 JEE Main 2025 · 23 Jan · Shift 2

Given below are two statements. One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : The binding energy per nucleon is found to be practically independent of the atomic number A , for nuclei with mass numbers between 30 and 170 .

Reason (R) : Nuclear force is long range. In the light of the above statements, choose the correct answer from the options given below :

(A) (A) is true but (R) is false

(B) Both (A) and (R) are true and (R) is the correct explanation of (A)

(C) (A) is false but (R) is true

(D) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)

[Step-by-step solution ► prepwiser.in/questions/E1PEBIB_Ia](https://www.prepwiser.in/questions/E1PEBIB_Ia)

Q71 JEE Main 2024 · 9 Apr · Shift 1

The energy equivalent of 1g of substance is :

(A) $5.6 \times 10^{26}\text{MeV}$

(B) $5.6 \times 10^{12}\text{MeV}$

(C) 5.6eV

(D) $11.2 \times 10^{24}\text{MeV}$

[Step-by-step solution ► prepwiser.in/questions/4TDqIHrKK-](https://www.prepwiser.in/questions/4TDqIHrKK-)

Q72 JEE Main 2024 · 8 Apr · Shift 2

If M_0 is the mass of isotope ${}_5^{12}\text{B}$, M_p and M_n are the masses of proton and neutron, then nuclear binding energy of isotope is:

(A) $(5M_p + 7M_n - M_0)C^2$

(B) $(M_0 - 5M_p - 7M_n)C^2$

(C) $(M_0 - 5M_p)C^2$

(D) $(M_0 - 12M_n)C^2$

[Step-by-step solution ► prepwiser.in/questions/ZjkjVC-nCI](https://www.prepwiser.in/questions/ZjkjVC-nCI)

Q73 JEE Main 2024 · 8 Apr · Shift 1

Binding energy of a certain nucleus is $18 \times 10^8\text{J}$. How much is the difference between total mass of all the nucleons and nuclear mass of the given nucleus:

(A) 20 μg

(B) 2 μg

(C) 10 μg

(D) 0.2 μg

[Step-by-step solution ► prepwiser.in/questions/ZiZ3cBwpod](https://www.prepwiser.in/questions/ZiZ3cBwpod)

Q74 JEE Main 2024 · 5 Apr · Shift 1

If three helium nuclei combine to form a carbon nucleus then the energy released in this reaction is _____ $\times 10^{-2}$ MeV. (Given $1u = 931\text{MeV}/c^2$, atomic mass of helium = $4.002603u$)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/AxYopCLRhq](https://www.prepwiser.in/questions/AxYopCLRhq)

Q75 JEE Main 2024 · 4 Apr · Shift 2

The disintegration energy Q for the nuclear fission of $^{235}\text{U} \rightarrow ^{140}\text{Ce} + ^{94}\text{Zr} + n$ is _____ MeV.
Given atomic masses of

$$^{235}\text{U} : 235.0439u; ^{140}\text{Ce} : 139.9054u, ^{94}\text{Zr} : 93.9063u; n : 1.0086u$$

, Value of $c^2 = 931\text{MeV}/u$.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/qgoacovSXf](https://www.prepwiser.in/questions/qgoacovSXf)

Q76 JEE Main 2024 · 1 Feb · Shift 2

From the statements given below :

- (A) The angular momentum of an electron in n^{th} orbit is an integral multiple of $\hbar$.
- (B) Nuclear forces do not obey inverse square law.
- (C) Nuclear forces are spin dependent.
- (D) Nuclear forces are central and charge independent.
- (E) Stability of nucleus is inversely proportional to the value of packing fraction.

Choose the **correct** answer from the options given below :

(A) (B), (C), (D), (E) only

(B) (A), (C), (D), (E) only

(C) (A), (B), (C), (E) only

(D) (A), (B), (C), (D) only

[Step-by-step solution ► prepwiser.in/questions/ajR1awTsY1](https://www.prepwiser.in/questions/ajR1awTsY1)

Q77 JEE Main 2024 · 31 Jan · Shift 1

The mass defect in a particular reaction is $0.4g$. The amount of energy liberated is $n \times 10^7 \text{kWh}$, where $n = \underline{\hspace{2cm}}$. (speed of light = $3 \times 10^8 \text{m/s}$)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/btg6xWkZAJ](https://www.prepwiser.in/questions/btg6xWkZAJ)

Q78 JEE Main 2024 · 27 Jan · Shift 1

In a nuclear fission process, a high mass nuclide ($A \approx 236$) with binding energy $7.6\text{MeV}/\text{Nucleon}$ dissociated into middle mass nuclides ($A \approx 118$), having binding energy of $8.6\text{MeV}/\text{Nucleon}$. The energy released in the process would be _____ MeV.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/VNh6ewfYfj](https://www.prepwiser.in/questions/VNh6ewfYfj)

Q79 JEE Main 2024 · 27 Jan · Shift 2

The atomic mass of ${}_6\text{C}^{12}$ is 12.000000u and that of ${}_6\text{C}^{13}$ is 13.003354u . The required energy to remove a neutron from ${}_6\text{C}^{13}$, if mass of neutron is 1.008665u , will be :

- (A) 62.5 MeV (B) 6.25 MeV
(C) 4.95 MeV (D) 49.5 MeV

Step-by-step solution ► [prepwiser.in/questions/zn8IoHJERW](https://www.prepwiser.in/questions/zn8IoHJERW)

Q80 JEE Main 2023 · 13 Apr · Shift 2

Given below are two statements: one is labelled as Assertion **A** and the other is labelled as Reason **R**
Assertion A : The binding energy per nucleon is practically independent of the atomic number for nuclei of mass number in the range 30 to 170 .

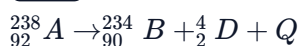
Reason R : Nuclear force is short ranged.

In the light of the above statements, choose the correct answer from the options given below

- (A) A is false but **R** is true
(B) A is true but **R** is false
(C) Both **A** and **R** are true and **R** is the correct explanation of **A**
(D) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**

Step-by-step solution ► [prepwiser.in/questions/IXbOINqFxl](https://www.prepwiser.in/questions/IXbOINqFxl)

Q81 JEE Main 2023 · 13 Apr · Shift 1



In the given nuclear reaction, the approximate amount of energy released will be:

[Given, mass of

$${}_{92}^{238}\text{A} = 238.05079 \times 931.5 \text{MeV}/c^2,$$

mass of

$${}_{90}^{234}\text{B} = 234.04363 \times 931.5 \text{MeV}/c^2,$$

mass of

$${}_2^4\text{D} = 4.00260 \times 931.5 \text{MeV}/c^2]$$

- (A) 2.12 MeV (B) 4.25 MeV
(C) 3.82 MeV (D) 5.9 MeV

Step-by-step solution ► [prepwiser.in/questions/pCj7VuAHCc](https://www.prepwiser.in/questions/pCj7VuAHCc)

Q82 JEE Main 2023 · 8 Apr · Shift 1

A nucleus with mass number 242 and binding energy per nucleon as 7.6MeV breaks into two fragment each with mass number 121. If each fragment nucleus has binding energy per nucleon as 8.1MeV , the total gain in binding energy is _____ MeV.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/0RFR5AS7BH](https://www.prepwiser.in/questions/0RFR5AS7BH)

Q83 JEE Main 2023 · 8 Apr · Shift 1

For a nucleus A_ZX having mass number A and atomic number Z

A. The surface energy per nucleon $(b_s) = -a_1 A^{2/3}$.

B. The Coulomb contribution to the binding energy $b_c = -a_2 \frac{Z(Z-1)}{A^{4/3}}$

C. The volume energy $b_v = a_3 A$

D. Decrease in the binding energy is proportional to surface area.

E. While estimating the surface energy, it is assumed that each nucleon interacts with 12 nucleons. (a_1, a_2 and a_3 are constants)

Choose the most appropriate answer from the options given below:

(A) C, D only

(B) B, C, E only

(C) B, C only

(D) A, B, C, D only

[Step-by-step solution ► prepwiser.in/questions/kUiM5Zij_v](https://www.prepwiser.in/questions/kUiM5Zij_v)

Q84 JEE Main 2023 · 1 Feb · Shift 1

The mass of proton, neutron and helium nucleus are respectively $1.0073u$, $1.0087u$ and $4.0015u$. The binding energy of helium nucleus is :

(A) 28.4MeV

(B) 56.8MeV

(C) 7.1MeV

(D) 14.2MeV

[Step-by-step solution ► prepwiser.in/questions/D5ebtctIq3](https://www.prepwiser.in/questions/D5ebtctIq3)

Q85 JEE Main 2023 · 1 Feb · Shift 2

Nucleus A having $Z = 17$ and equal number of protons and neutrons has 1.2MeV binding energy per nucleon.

Another nucleus B of $Z = 12$ has total 26 nucleons and 1.8MeV binding energy per nucleons.

The difference of binding energy of B and A will be _____ MeV.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/TOJrYqD-86](https://www.prepwiser.in/questions/TOJrYqD-86)

Q86 JEE Main 2023 · 31 Jan · Shift 1

A free neutron decays into a proton but a free proton does not decay into neutron. This is because

(A) neutron is an uncharged particle

(B) neutron has larger rest mass than proton

(C) neutron is a composite particle made of a proton and an electron

(D) proton is a charged particle

[Step-by-step solution ► prepwiser.in/questions/2GIs_m3srF](https://www.prepwiser.in/questions/2GIs_m3srF)

Q87 JEE Main 2022 · 28 Jun · Shift 1

The Q-value of a nuclear reaction and kinetic energy of the projectile particle, K_p are related as :

- (A) $Q = K_p$
- (B) $(K_p + Q) < 0$
- (C) $Q < K_p$
- (D) $(K_p + Q) > 0$

Step-by-step solution ► [prepwisser.in/questions/sjNM2kegcI](https://www.prepwisser.in/questions/sjNM2kegcI)

Q88 JEE Main 2021 · 25 Jul · Shift 2

From the given data, the amount of energy required to break the nucleus of aluminium ${}_{13}^{27}\text{Al}$ is _____ $\times 10^{-3}$ J.

Mass of neutron = 1.00866 u

Mass of proton = 1.00726 u

Mass of Aluminium nucleus = 27.18846 u

(Assume 1 u corresponds to x J of energy)

(Round off to the nearest integer)

Numerical answer — enter the value.

Step-by-step solution ► [prepwisser.in/questions/I05G9cH4Zi](https://www.prepwisser.in/questions/I05G9cH4Zi)

Q89 JEE Main 2020 · 6 Sep · Shift 2

Given the masses of various atomic particles

$m_p = 1.0072$ u, $m_n = 1.0087$ u, $m_e = 0.000548$ u,

$m_{\bar{\nu}} = 0$, $m_d = 2.0141$ u, where p $\equiv$ proton, n $\equiv$ neutron,

e $\equiv$ electron, $\bar{\nu}$ $\equiv$ antineutrino and d $\equiv$ deuteron. Which of the following process is allowed by momentum and energy conservation?

- (A) $n + n \rightarrow$ deuterium atom
(electron bound to the nucleus)
- (B) $n + p \rightarrow d + \gamma$
- (C) $p \rightarrow n + e^+ + \bar{\nu}$
- (D) $e^+ + e^- \rightarrow \gamma$

Step-by-step solution ► [prepwisser.in/questions/5AUBQA_o3y](https://www.prepwisser.in/questions/5AUBQA_o3y)

Q90 JEE Main 2020 · 6 Sep · Shift 1

You are given that Mass of ${}^7_3\text{Li} = 7.0160\text{u}$,

Mass of ${}^4_2\text{He} = 4.0026\text{u}$

and Mass of ${}^1_1\text{H} = 1.0079\text{u}$.

When 20 g of ${}^7_3\text{Li}$ is converted into ${}^4_2\text{He}$ by proton capture, the energy liberated, (in kWh), is :

[Mass of nucleon = $1\text{ GeV}/c^2$]

(A) 6.82×10^5

(B) 4.5×10^5

(C) 8×10^6

(D) 1.33×10^6

Step-by-step solution ► [prepwisser.in/questions/mf6SF5tiyW](https://www.prepwisser.in/questions/mf6SF5tiyW)

Q91 JEE Main 2020 · 4 Sep · Shift 2

Find the Binding energy per nucleon for ${}^{120}_{50}\text{Sn}$. Mass of proton $m_p = 1.00783\text{ U}$, mass of neutron $m_n = 1.00867\text{ U}$ and mass of tin nucleus $m_{\text{Sn}} = 119.902199\text{ U}$. (take $1\text{ U} = 931\text{ MeV}$)

(A) 9.0 MeV

(B) 8.5 MeV

(C) 8.0 MeV

(D) 7.5 MeV

Step-by-step solution ► [prepwisser.in/questions/iNJuNDAm7K](https://www.prepwisser.in/questions/iNJuNDAm7K)

Answer key — Nuclear Physics

Numbers match the question numbers above. For full working, open the solution link under each question.

1	B	2	C	3	27	4	4	5	B	6	C	7	B	8	11
9	B	10	C	11	C	12	B	13	D	14	C	15	2	16	6
17	C	18	D	19	B	20	4	21	87	22	B	23	A	24	D
25	B	26	C	27	B	28	B	29	A	30	C	31	A	32	B
33	15	34	B	35	300	36	C	37	B	38	9	39	A	40	C
41	15	42	D	43	C	44	C	45	20	46	B	47	C	48	25
49	B	50	B	51	150	52	C	53	10	54	D	55	D	56	20
57	C	58	D	59	B	60	D	61	D	62	B	63	A	64	A
65	5	66	A	67	A	68	26	69	C	70	A	71	A	72	A
73	A	74	727	75	208	76	C	77	1	78	236	79	C	80	C
81	B	82	121	83	A	84	A	85	6	86	B	87	D	88	27
89	B	90	D	91	B										

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