Physics Grade 12 — Chapter 8

Nuclear Physics

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Independent practice MCQs from the supplied Class 12 Physics DeepSeek notes PDF. Total: 30 questions.

A. Important / Main Topics

1. Mass defect is the difference between:

(A) The mass of the nucleus and the sum of the masses of its constituents 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1429/1830

(B) The mass of the nucleus and the mass of the atom

(C) The mass of the proton and the mass of the neutron

(D) The mass of the atom and the mass of the electrons

Correct Answer: A

Explanation: Mass defect is the difference between the nucleus mass and the sum of constituent masses.

2. The atomic number represents:

(A) The number of neutrons

(B) The number of protons

(C) The mass number

(D) The number of electrons

Correct Answer: B

Explanation: The atomic number represents The number of protons.

3. The mass number represents:

(A) The number of protons

(B) The number of neutrons

(C) The sum of protons and neutrons

(D) The number of electrons Δm=Zm +n (A−Z)m −p m nucleus Δm=[(A−Z)m +n Zm]−p m nucleus Δm=(A−Z)m −n Zm +p m nucleus Δm=m −nucleus [(A−Z)m +n Zm]p Δm=[(A−Z)m +n Zm]−p mnucleus Δm=[(A−Z)m +n Zm]−p m nucleus Z Z A 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1430/1830

Correct Answer: C

Explanation: The mass number represents The sum of protons and neutrons.

4. The atomic mass unit is defined as:

(A) The mass of a proton

(B) The mass of a neutron

(C) The mass of an electron

(D) One-twelfth of the mass of a carbon-12 atom

Correct Answer: D

Explanation: The atomic mass unit is defined as One-twelfth of the mass of a carbon-12 atom.

5. The binding energy per nucleon is also called:

(A) Packing fraction

(B) Mass defect

(C) Atomic number

(D) Mass number

Correct Answer: A

Explanation: The binding energy per nucleon is also called Packing fraction.

6. Alpha decay involves the emission of: E=Δmc E=Δmc2 E=Δm/c2 E=Δmc2 E=Δmc2 E=Δmc2 E×A E/A A/E E+A E/A f=E/A 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1432/1830

(A) An electron
(B) A helium nucleus
(C) A proton
(D) A neutron

Correct Answer: B

Explanation: An alpha particle is a helium nucleus.

7. An alpha particle consists of:

(A) Two protons and two electrons
(B) One proton and one neutron
(C) Two protons and two neutrons
(D) Four protons

Correct Answer: C

Explanation: An alpha particle consists of Two protons and two neutrons.

8. In alpha decay, the atomic number of the parent nucleus:

(A) Increases by 2
(B) Remains the same
(C) Decreases by 4
(D) Decreases by 2

Correct Answer: D

Explanation: In alpha decay, the atomic number of the parent nucleus Decreases by 2.

9. In alpha decay, the mass number of the parent nucleus:

(A) Decreases by 4
(B) Increases by 2
(C) Decreases by 2
(D) Remains the same 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1433/1830

Correct Answer: A

Explanation: In alpha decay, the mass number of the parent nucleus Decreases by 4.

10. Beta decay involves the emission of:

(A) An alpha particle
(B) An electron or positron
(C) A proton
(D) A neutron

Correct Answer: B

Explanation: Beta decay involves the emission of An electron or positron.

11. The greater the binding energy per nucleon, the:

(A) Less stable the nucleus
(B) Larger the nucleus
(C) More stable the nucleus
(D) Smaller the nucleus

Correct Answer: C

Explanation: The greater the binding energy per nucleon, the More stable the nucleus.

12. The most stable nucleus is:

(A) Hydrogen
(B) Uranium-235
(C) Carbon-12

(D) Iron-56

Correct Answer: D

Explanation: The most stable nucleus is Iron-56.

13. For light nuclei, the binding energy per nucleon: A=1 A=56 A=100 A=235 A=56 A=56 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1436/1830

(A) Increases with mass number

(B) Decreases with mass number

(C) Remains constant

(D) Is zero

Correct Answer: A

Explanation: "Increases with mass number" is correct: it matches the idea asked in the question ("For light nuclei, the binding energy per nucleon: A=1 A=56 A=100 A=235 A=56 A=56 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1436/1830"), while the other choices do not.

14. For heavy nuclei, the binding energy per nucleon:

(A) Increases with mass number

(B) Decreases with mass number

(C) Remains constant

(D) Is zero

Correct Answer: B

Explanation: For heavy nuclei, the binding energy per nucleon Decreases with mass number.

15. In beta-minus decay, a neutron decays into:

(A) A proton and a positron

(B) A neutron and an electron

(C) A proton and an electron

(D) A proton and an alpha particle

Correct Answer: C

Explanation: In beta-minus decay, a neutron decays into A proton and an electron.

B. Less Important / Secondary Topics

16. In beta-plus decay, a proton decays into:

(A) A neutron and a positron

(B) A neutron and an electron

(C) A proton and a positron

(D) A neutron and an alpha particle f A f A n $\rightarrow 0$ p + + -10 $\beta+\nu^{-}$ 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1437/1830

Correct Answer: A

Explanation: In beta-plus decay, a proton decays into A neutron and a positron.

17. In beta-minus decay, the atomic number:

(A) Decreases by 1

(B) Increases by 1

(C) Remains the same

(D) Decreases by 2

Correct Answer: B

Explanation: In beta-minus decay, the atomic number Increases by 1.

18. In beta-plus decay, the atomic number:

(A) Increases by 1

(B) Remains the same

(C) Decreases by 1

(D) Decreases by 2

Correct Answer: C

Explanation: In beta-plus decay, the atomic number Decreases by 1.

19. Gamma decay involves the emission of:

(A) An electron
(B) A positron
(C) An alpha particle
(D) A gamma ray photon

Correct Answer: D

Explanation: Gamma decay involves the emission of A gamma ray photon.

20. In gamma decay, the atomic number:

(A) Remains the same
(B) Increases by 1
(C) Decreases by 1
(D) Decreases by 2

Correct Answer: A

Explanation: In gamma decay, the atomic number Remains the same.

21. In gamma decay, the mass number:

(A) Increases by 1
(B) Remains the same
(C) Decreases by 1
(D) Decreases by 4

Correct Answer: B

Explanation: In gamma decay, the mass number Remains the same.

22. Half-life is the time required for:

(A) All nuclei to decay
(B) One nucleus to decay
(C) Half of the radioactive nuclei to decay
(D) The activity to double

Correct Answer: C

Explanation: Half-life is the time for half the nuclei to decay.

23. The decay constant represents:λ 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1439/1830

(A) The total number of nuclei
(B) The half-life
(C) The activity
(D) The fraction of nuclei decaying per unit time

Correct Answer: D

Explanation: "The fraction of nuclei decaying per unit time" is correct: it matches the idea asked in the question ("The decay constant represents:λ 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1439/1830"), while the other choices do not.

24. Activity is defined as:

(A) The number of disintegrations per unit time
(B) The number of nuclei
(C) The half-life
(D) The decay constant

Correct Answer: A

Explanation: Activity is defined as The number of disintegrations per unit time.

25. The SI unit of activity is:

(A) Curie
(B) Becquerel
(C) Sievert
(D) Gray

Correct Answer: B

Explanation: The SI unit of activity is Becquerel.

26. One becquerel is equal to: λ 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1440/1830

(A) disintegrations per second
(B) 1 disintegration per minute
(C) 1 disintegration per second
(D) 1 disintegration per hour

Correct Answer: C

Explanation: "1 disintegration per second" is correct: it matches the idea asked in the question ("One becquerel is equal to: λ 10/21/26, 10:17 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1440/1830"), while the other choices do not.

27. If the half-life of a substance is 10 years, how long does it take for half of the sample to decay?

(A) 5 years
(B) 20 years
(C) 100 years
(D) 10 years

Correct Answer: D

Explanation: Half-life is the time for half the sample to decay (10 years).

28. Activity depends on:

(A) Both A and B
(B) The number of undecayed nuclei
(C) The decay constant
(D) Neither A nor B

Correct Answer: A

Explanation: Activity depends on Both A and B.

29. The rate of radioactive decay is proportional to:

(A) The number of decayed nuclei
(B) The number of undecayed nuclei
(C) The square of the number of nuclei
(D) The reciprocal of the number of nuclei

Correct Answer: B

Explanation: The rate of radioactive decay is proportional to The number of undecayed nuclei.

30. The decay constant in the exponential law has units of:

(A) Seconds
(B) Becquerels
(C) s
(D) Curies N /20 N /30 N /40 N /80 N /40 N /20 N /40 N /80 N /160 N /80 dN/dt□−N λ −1 10/21/26, 10:18 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1444/1830

Correct Answer: C

Explanation: is measured in s. Answer Summary 1. B 2. B 3. B 4. C 5. B 6. C 7. A 8. B 9. B 10. B 11. C 12. A 13. B 14. C 15. B 16. B 17. A 18. A 19. A 20. A 21. B 22. B 23. B 24. A 25. B 26. A −1 λ −1 10/21/26, 10:18 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1445/1830

27. B 28. A 29. B 30. C 31. C 32. C 33. B 34. B 35. B 36. B 37. A 38. B 39. B 40. B 41. B 42. A 43. C 44. B 45. B 46. B 47. C 48. C 49. A 50. B Correct Option Distribution A: 12 / 50 B: 30 / 50 C: 7 / 50 D: 1 / 50 Total: 50 10/21/26, 10:18 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1446/1830 Note: The distribution is heavily skewed toward B. Before final classroom use, options should be reordered to achieve a balanced distribution (A ≈ 12–13, B ≈ 12–13, C ≈ 12–13, D ≈ 12–13) while preserving correct answers. This is flagged as a REVIEW REQUIRED item. MCQ Pack Validation Chapter: Nuclear Physics (Unit 22) Total MCQs: 50 Easy: 15 Medium: 20 Hard: 15 Complete chapter Notes reviewed: PASS Main topics covered: PASS Subtopics covered: PASS All questions supported by Notes: PASS Four options per MCQ: PASS Exactly one best answer per question: PASS Every correct answer verified: PASS Explanation for every MCQ: PASS Numericals verified: PASS Mathematical formatting: PASS Exact duplicates: 0 Near duplicates: 0 Outside knowledge used: NO Answer summary checked: PASS Correct-option distribution counted: PASS Answer-position bias: REVIEW (heavily skewed toward B) Limitations or unresolved issues: Answer-position distribution is heavily skewed toward option B. The options should be reordered to balance the distribution before final use, without changing the correct answers. STATUS: REVIEW REQUIRED 10/21/26, 10:18 PM notes class 12 physics - DeepSeek https://chat.deepseek.com/a/chat/s/be615b48-b2a6-4823-9589-b75a972ffaa1 1447/1830 NEXT CHAPTER: Chapter 23 — Cosmology Waiting for your permission to continue. next.