RK VISION ACADEMY

PHYSICS

XII – NUCLEI

SECTION A

1. **Which of the following particles are constituents of the nucleus**

(1) Protons and electrons
(2) Protons and neutrons
3) Neutrons and electrons
(4) Neutrons and positrons

2. **The particles which can be added to the nucleus of an atom without changing its chemical properties are called**

(1) Electrons
(2) Protons
(3) Neutrons
(4) None of the above

3. **The neutron was discovered by**

(1) Marie Curie
(2) Pierre Curie
(3) James Chadwick
(4) Rutherford

4. **The mass number of a nucleus is**

(1) Always less than its atomic number
(2) Always more than its atomic number
(3) Always equal to its atomic number
(4) Sometimes more than and sometimes equal to its atomic number

5. **The energy equivalent of 1 *kilogram* of matter is about**

(1) $10^{-15}J$
(2) $1\ J$
(3) $10^{-12}J$
(4) P_0J

6. **Nuclear binding energy is equivalent to**

(1) Mass of proton
(2) Mass of neutron
(3) Mass of nucleus
(4) Mass defect of nucleus

7. **If the binding energy of the deutrium is 2.23 *MeV.* The mass defect given in *a.m.u.* is**

(1) – 0.0024
(2) – 0.0012
(3) 0.0012
(4) 0.0024

8. **Which of the following has the mass closest in value to that of the positron**

(1) Proton
(2) Electron
(3) Photon
(4) Neutrino

9. **Size of nucleus is of the order of**

(1) $10^{-10}m$
(2) $10^{-15}m$
(3) $10^{-12}m$
(4) $10^{-19}m$

10. **For effective nuclear forces, the distance should be**

(1) $10^{-10}m$
(2) $10^{-13}m$
(3) $10^{-15}m$
(4) $10^{-20}m$

11. **The masses of neutron and proton are 1.0087 *a.m.u.* and 1.0073 *a.m.u.* respectively. If the neutrons and protons combine to form a helium nucleus (alpha particles) of mass 4.0015 *a.m.u.* The binding energy of the helium nucleus will be (1 *a.m.u.*= 931 *MeV*)**

(1) 28.4 *MeV*
(2) 20.8 *MeV*
(3) 27.3 *MeV*
(4) 14.2 *MeV*

12. **The mass defect for the nucleus of helium is 0.0303 *a.m.u.* What is the binding energy per nucleon for helium in *MeV***

(1) 28

(2) 7

(3) 4

(4) 1

13. **Atomic power station at Tarapore has a generating capacity of 200 *MW*. The energy generated in a day by this station is**

(1) 200 *MW*

(2) 200 *J*

(3) $4800 \times 10^6 J$

(4) $1728 \times 10^{10} J$

14. **One microgram of matter converted into energy will give**

(1) 90 *J*

(2) $9 \times 10^3 J$

(3) $9 \times 10^{10} J$

(4) $9 \times 10^5 J$

15. **The average binding energy per nucleon in the nucleus of an atom is approximately**

(1) 8 *eV*

(2) 8 *KeV*

(3) 8 *MeV*

(4) 8 *J*

16. **The binding energy of deuteron $_1H^2$ is 1.112 *MeV* per nucleon and an α −particle $_2He^4$ has a binding energy of 7.047 *MeV* per nucleon. Then in the fusion reaction $_1H^2 + {}_1H^2 \rightarrow {}^4_2He + Q$, the energy Q released is**

(1) 1 *MeV*

(2) 11.9 *MeV*

(3) 23.8 *MeV*

(4) 931 *MeV*

17. **Binding energy of a nucleus is**

(1) Energy given to its nucleus during its v formation

(2) Total mass of nucleus converted to energy units

(3) Loss of energy from the nucleus during its formation

(4) Total K.E. and P.E. of the nucleons in the nucleus

18. **One requires energy E_n to remove a nucleon from a nucleus and an energy $'E_e'$ to remove an electron from the orbit of an atom. Then**

(1) $E_n = E_e$

(2) $E_n < E_e$

(3) $E_n > E_e$

(4) $E_n \geq E_e$

19. **Which of the following pairs is an isobar**

(1) $1H^1$ and $1H^2$

(2) $1H^2$ and $1H^3$

(3) $6C^{12}$ and $6C^{13}$

(4) $15P^{30}$ and $14Si^{30}$

20. **Equivalent energy of mass equal to 1 *a.m.u.* is**

(1) 931 *KeV*

(2) 931 *eV*

(3) 931 *MeV*

(4) 9.31 *MeV*

21. **The binding energies per nucleon for a deuteron and an α −particle are x_1 and x_2 respectively. What will be the energy Q released in the reaction $1H^2 + {}_1H^2 \rightarrow {}_2He^4 + Q$**

(1) $4(x_1 + x_2)$

(2) $4(x_2 - x_1)$

(3) $2(x_1 + x_2)$

(4) $2(x_2 - x_1)$

22. **The mass number of a nucleus is equal to the number of**

(1) Electrons it contains

(2) Protons it contains

(3) Neutrons it contains

(4) Nucleons it contains

23. **The rest energy of an electron is**

(1) 510 *KeV*

(2) 931 *KeV*

(3) 510 *MeV*

(4) 931 *MeV*

24. **In $_{88}Ra^{226}$ nucleus, there are**

(1) 138 protons and 88 neutrons

(2) 138 neutrons and 88 protons

(3) 226 protons and 88 electrons

(4) 226 neutrons and 138 electrons

25. **Outside a nucleus**

(1) Neutron is stable

(2) Proton and neutron both are stable

(3) Neutron is unstable

(4) Neither neutron nor proton is stable

26. **Order of magnitude of density of uranium nucleus is ($m_p = 1.67 \times 10^{-27} kg$)**

(1) $10^{20} kg/m^3$

(2) $10^{17} kg/m^3$

(3) $10^{14} kg/m^3$

(4) $10^{11} kg/m^3$

27. **Radius of $_2He^4$ nucleus is 3 *Fermi.* The radius of $3 \rightarrow 2$nucleus will be**

(1) 5 *Fermi*

(2) 6 *Fermi*

(3) 11.16 *Fermi*

(4) 8 *Fermi*

28. **Nucleus of an atom whose atomic mass is 24 consists of**

(1) 11 electrons, 11 protons and 13 neutrons

(2) 11 electrons, 13 protons and 11 neutrons

(3) 11 protons and 13 neutrons

(4) 11 protons and 13 electrons

29. **Atomic weight of boron is 10.81 and it has two isotopes $5B^{10}$and $5B^{11}$. Then ratio of $5B^{10}$:$_5$ B^{11}in nature would be**

(1) 19:81

(2) 10 : 11

(3) 15 : 16

(4) 81 : 19

30. **The mass of a neutron is the same as that of**

(1) A proton

(2) A meson

(3) An epsilon

(4) An electron

31. **The mass defect per nucleon is called**

(1) Binding energy

(2) Packing fraction

(3) Ionisation energy

(4) Excitation energy

32. **Nuclear forces are**

(1) Short ranged attractive and charge independent

(2) Short ranged attractive and charge dependent

(3) Long ranged repulsive and charge independent

(4) Long ranged repulsive and charge dependent

33. **In helium nucleus, there are**

(1) 2 protons and 2 electrons

(2) 2 neutrons, 2 protons and 2 electrons

(3) 2 protons and 2 neutrons

(4) 2 positrons and 2 protons

34. **Antiparticle of electron is**

(1) ${}_0n^1$

(2) $1 \rightleftarrows H^1$

(3) Positron

(4) Neutrino

35. **The binding energy per nucleon is maximum in the case of**

(1) ${}_2He^4$

(2) ${}_{26}Fe^{56}$

(3) ${}_{56}Ba^{141}$

(4) ${}_{92}U^{235}$

SECTION B

36. **Isotopes are atoms having**

(1) Same number of protons but different number of neutrons

(2) Same number of neutrons but different number of protons

(3) Same number of protons and neutrons

(4) None of the above

37. **The mass of an α-particle is**

(1) Less than the sum of masses of two protons and two neutrons

(2) Equal to mass of four protons

(3) Equal to mass of four neutrons .

(4) Equal to sum of masses of two protons and two neutrons

38. **If the binding energy per nucleon in Li^7 and He^4 nuclei are respectively 5.60 *MeV* and 7.06 *MeV*, then energy of reaction $Li^7 + p \rightarrow 2\ {}_2He^4$ is**

(1) 19.6 *MeV*

(2) 2.4 *MeV*

(3) 8.4 *MeV*

(4) 17.3 *MeV*

39. **The mass number of *He* is 4 and that for sulphur is 32. The radius of sulphur nucleus is larger than that of helium, by times**

(1) $\sqrt{8}$

(2) 4

(3) 2

(4) 8

40. **A nucleus ruptures into two nuclear parts which have their velocity ratio equal to 2 : 1. What will be the ratio of their nuclear size (nuclear radius)**

(1) $2^{1/3}:1$

(2) $1:2^{1/3}$

(3) $3^{1/2}:1$

(4) $1:3^{1/2}$

41. **Energy of 1*g* uranium is equal to**

(1) $9.0 \times 10^{13} J$

(2) $9.0 \times 10^{19} J$

(3) $3.0 \times 10^{16} J$

(4) $3.0 \times 10^{17} J$

42. **In a fission reaction ${}_{92}U^{236} \rightarrow {}^{117}X + {}^{117}Y + n + n$, the binding energy per nucleon of *X* and *Y* is 8.5 *MeV* whereas of $236U$ is 7.6 *MeV*. The total energy liberated will be about**

(1) 200 *KeV*

(2) 2 *MeV*

(3) 200 *MeV*

(4) 2000 *MeV*

43. **Atomic number of a nucleus is Z and atomic mass is M. The number of neutron is**

(1) $M - Z$

(2) M

(3) Z

(4) $M + Z$

44. **The α-particle is the nucleus of an atom of**

(1) Neon

(2) Hydrogen

(3) Helium

(4) Deuterium

45. **The force acting between proton and proton inside the nucleus is**

(1) Coulombic

(2) Nuclear

(3) Both

(4) None of these

46. **For a nucleus to be stable, the correct relation between neutron number N and Proton number Z is**

(1) $N > Z$

(2) $N = Z$

(3) $N < Z$

(4) $N \geq Z$

47. **Two nucleons are at a separation of $1 \times 10^{-15} m$. The net force between them is F_1, if both are neutrons, F_2 if both are protons and F_3 if one is a proton and other is a neutron. In such a case**

(1) $F_2 > F_1 > F_3$

(2) $F_1 = F_2 = F_3$

(3) $F_1 = F_2 > F_3$

(4) $F_1 = F_3 > F_2$

48. **M_n and M_p represent mass of neutron and proton respectively. If an element having atomic mass M has N-neutron and Z-proton, then the correct relation will be**

(1) $M < [NM_n + ZM_P]$

(2) $M > [NM_n + ZM_P]$

(3) $M = [NM_n + ZM_P]$

(4) $M = N[M_n + M_P]$

49. **If a H_2 nucleus is completely converted into energy, the energy produced will be around**

(1) 1 MeV

(2) 938 MeV

(3) 9.38 MeV

(4) 238 MeV

50. **The radius of a nucleus of a mass number A is directly proportional to**

(1) A^3

(2) A

(3) $A^{2/3}$

(4) $A^{1/3}$

RK VISION ACADEMY

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XII – NUCLEI	
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12.	2
13.	4
14.	3
15.	3
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17.	3
18.	3
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