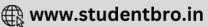
Nuclei

- **1. Assertion (A):** When a beam of highly energetic neutrons is incident on a tungsten target, X-rays will be produced.
 - **Reason (R):** Neutrons do not exert any electrostatic force on electrons or nucleus of an atom.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **2. Assertion (A):** Strong nuclear force holds protons inside nucleus.
 - **Reason (R):** Strong nuclear force is not a fundamental force.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- 3. Assertion (A): Consider the following nuclear reaction of an unstable ${}^{14}_6\mathrm{C}$ nucleus initially at rest. The decay ${}^{14}_6\mathrm{C} \longrightarrow {}^{14}_7\mathrm{N} + {}^0_{-1}\mathrm{e} + \overline{\mathrm{v}}$. In a nuclear reaction total energy and momentum is conserved experiments show that the electrons are emitted with a continuous range of kinetic energies upto some maximum value.
 - **Reason (R):** Remaining energy is released as thermal energy.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false

- **4. Assertion (A):** The Q value of nuclear process is Q = total final binding energy total initial binding energy.
 - **Reason (R):** The Q value of nuclear reaction initially appears in form of kinetic energy of products.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- 5. Assertion (A): The effective mass of β -particles when they are emitted is higher than the mass of electrons obtained by Milikan oil-drop experiment.
 - **Reason (R):** β -particle and electron, both are similar particles.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **6. Assertion (A):** If number of protons in a nucleus is more than number of neutrons present, the nucleus is unstable.
 - **Reason (R):** Electrostatic force between two protons in a nucleus dominates over the nuclear force between them.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **7. Assertion (A):** Nucleus having more binding energy is more stable
 - **Reason (R):** Stability increases with increase in number of nucleons.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false





8. Assertion (A): Fe^{56} nucleus is more stable than U^{235} nucleus.

Reason (R): Binding energy of Fe⁵⁶ nucleus is more than binding energy of U²³⁵

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **9. Assertion (A):** Electron capture occurs more often than positron emission in heavy elements.

Reason (R): Heavy elements exhibit radioactivity.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **10. Assertion (A):** Strong nuclear force is fundamental quark-quark interaction.

Reason (R): Strong nuclear force is shortest range force in nature.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **11. Assertion (A):** The value of Rydberg constant is independent of mass of nucleus.

Reason (R): Electrons revolve around stationary nucleus of atom.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

12. Assertion (A): Fragments produced in the fission of $_{92}^{235}$ U are radioactive.

Reason (R): The fragments have abnormally high proton to neutron ratio.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **13. Assertion (A):** The binding energy per nucleon, for nuclei with atomic mass number A > 100 decreases with A.

Reason (R): The nuclear forces become weaker for heavier nuclei.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **14. Assertion (A):** All protons have non zero magnetic moment.

Reason (R): All nuclei have non zero magnetic moment.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **15. Assertion (A):** Rydberg constant varies with mass number of a given element.

Reason (R): The reduced mass of electron depends on the mass of the nucleus.

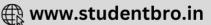
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- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false



- **16. Assertion (A):** Although elements are different, their nuclei are of the same size.
 - **Reason (R):** Nuclear density is not same for all nuclei.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **17. Assertion (A):** Neutrons penetrate matter more readily as compared to protons.
 - **Reason (R):** Neutrons are slightly more massive than protons.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **18. Assertion (A):** Energy released in one fusion process is less than the energy released in a single fission event.
 - **Reason (R):** Fusion is a weaker source of energy than fission.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **19. Assertion (A):** Fragments produced in fission of ²³⁵U are radioactive.
 - **Reason (R):** The entire mass of atom is concentrated in the nucleus.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false

- **20. Assertion (A):** Nuclear forces are charge dependent forces.
 - **Reason (R):** Nuclear forces are attractive forces.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **21. Assertion (A):** A nuclei has more mass than the sum of the masses of the individual nucleons in them.
 - **Reason (R):** In nuclei, number of neutrons is less than the number of electrons.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **22. Assertion (A):** Isotopes of an element can be separated by using a mass spectrometer.
 - **Reason (R):** Separation of isotopes is possible because of the difference in electron numbers of isotopes.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **23. Assertion (A):** Nuclear binding energy per nucleon is in the ${}_{4}^{9}Be > {}_{2}^{7}Li > {}_{2}^{4}He$.
 - **Reason (R):** Binding energy per nucleon increases linearly with difference in number of neutrons and protons.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false





24. Assertion (A): Energy is released when heavy nuclei undergo fission or light nuclei undergo fusion.

Reason (R): For heavy nuclei, binding energy per nucleon increases with increasing Z while for light nuclei, it decreases with increasing Z.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- 25. Assertion (A): Size of nucleus determined electron scattering and α -scattering are same.

Reason (R): Electron scattering or by α -scattering is controlled by distribution of charge in nucleus.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **26. Assertion (A):** It is very easy to detect neutrino in nature.

Reason (R): It has high affinity to interact with matter.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **27. Assertion (A):** More energy is released in fusion than fission per nucleon.

Reason (R): More number of nucleons takes part in fusion.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

28. Assertion (A): Deuterium is a good moderator of fast neutrons.

Reason (R): Fast neutrons transfer 90% of their kinetic energy to the nuclei of the moderator in an elastic collision.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **29. Assertion (A):** Beryllium, can be used as a moderator in nuclear fission reactor.

Reason (R): A fast moving electron on collision with a light stationary particle loses most of its energy in nuclear reactor.

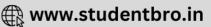
- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **30. Assertion (A):** Nuclear force is short range while gravitation and electric force are universal.

Reason (R): Nuclear force does not follow inverse square law.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false







	ANSWER KEY																			
Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	2	3	3	2	2	3	4	3	2	4	2	3	3	3	1	4	2	3	2	4
Que.	21	22	23	24	25	26	27	28	29	30										
Ans.	4	3	4	3	4	4	2	3	3	2										

