Atoms
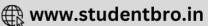
1. **Assertion (A):** On the atomic scale, mass is measured in atomic mass units (u).
   Reason (R): 1u is 1/12th mass of one atom of C^{12} (1u = 1.66 × 10⁻²⁷ kg)
   (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
   (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
   (3) (A) is true but (R) is false
   (4) Both (A) and (R) are false

2. **Assertion (A):** Bohr model can explain spectra of hydrogen or hydrogen like species.
   Reason (R): Bohr model is the best atomic model.
   (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):** Zeeman effect is strong evidence of magnetic quantum number.
   Reason (R): Magnetic quantum number is the result of space quantization.
   (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):** Wavelength of continuous X-ray varies from a minimum value to infinity.
   Reason (R): Continuous X-rays are emitted due to transition of electron from higher to lower energy level.
   (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):** Penetration power of hard X-ray is more than that of soft X-ray.
   Reason (R): Hard X-ray is used for engineering purpose while soft X-ray is used for medical purpose.
   (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):** An electron and a positron moving towards each other with equal and opposite velocities can annihilate into photons.
   Reason (R): A photon has non zero energy and momentum
   (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):** For the scattering of α−particles at a large angles only the nucleus of the atom is responsible.
   Reason (R): Nucleus is very heavy in comparison to 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

8. **Assertion (A):** When white radiations (visible light) are passed through a sample of hydrogen gas at room temperature, absorption lines corresponding to Lyman series only are obtained.
   Reason (R): At room temperature hydrogen atom is in the ground state.
   (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):** In H-atom, according to Bohr's theory, electron revolves around the nucleus in orbits in which the angular momentum of electron is as integral multiple of h/2π.

   Reason (R): Mass of electron is equal to the mass of proton.

   (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):** The ratio of wavelength in first transition of lyman series for H atom and He$^+$ atom is exactly equal to four

   Reason (R): In all atoms electron revolve around fixed 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

11. **Assertion (A):** If the accelerating potential in an X-ray tube is increased, the wavelength of the characteristic X-rays does not change.

   Reason (R): When an electron beam strikes the target in an X-ray tube, part of the kinetic energy is converted into X-ray 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

12. **Assertion (A):** It is essential that all the lines available in the emission spectrum will also be available in the absorption spectrum.

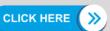   **Reason (R):** The spectrum of hydrogen atom is only absorption spectrum.

   (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):** Bohr postulates that the electrons in stationary orbits around the nucleus do not radiate.
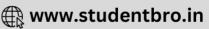
   Reason (R): According to classical physics all moving electrons radiate.

   (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):** Anode of Coolidge tube gets heated up at time of emission of X-rays.

   Reason (R): The anode of Coolidge tube is made of a material of high melting point.

   (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):** In a Bohr's atom, frequency of revolution of an electron in its orbit is same as frequency of spectral line, for transition between large quantum numbers.

Reason (R): As Principal quantum number increases in a Bohr's atom, energy gap between the energy levels decreases.
(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

16. **Assertion (A):** When the speed of an electron increases its specific charge decreases.

Reason (R): Specific charge is the ratio of the mass to charge.
(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):** A beam of charged particles is employed in the treatment of cancer.

Reason (R): Charged particles on passing through a material medium lose their energy by causing ionization of the atoms along their path.
(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):** Wavelength of Lyman scries is less than of Balmer series.

Reason (R): In hydrogen spectrum Balmer scries belongs to visible spectrum.
(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):** The frequency of K_α X-radiations is greater than K_β for a given target.

Reason (R): K_α radiation is produced when an electron from n = 2 jumps into the vacancy in n = 1 orbit, whereas in K_β radiation the transition takes place from n = 3 to n = 2.
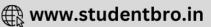(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Frequency of characteristic X-ray will change if atomic number of target is changed.

Reason (R): When high energy electron strikes on target then characteristics and continuous X-rays are emitted.
(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 hydrogen atom can absorb a photon whose energy is greater than 13.6 eV.

Reason (R): The binding energy of a hydrogen atom is 13.6 eV.

(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):** A welder uses mouth mask for protection of eyes.

Reason (R): Welding arc produces X-rays.

(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):** The electron will be ejected from a hydrogen atom when electron beam of kinetic energy 10.6 eV falls on it.

Reason (R): The difference between n_1 and n_2 is 10.2 eV.

(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):** Laser has very height intensity.

Reason (R): Light from laser overlap constructively.

(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):** In sodium nucleus $^{23}_{11}\text{Na}$, there are no electrons.

Reason (R): Atomic number of sodium is 11.

(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

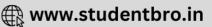26. **Assertion (A):** It is easier to release an orbital electron, but quite difficult to release a nucleon.

Reason (R): An electron is much lighter than a nucleon.

(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):** Atoms of greater mass number are more stable,

Reason (R): Their mass defects are more.

(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	2	3	2	2	2	4	3	3	2	4	3	2	2	3	2	2	4	2
Que.	21	22	23	24	25	26	27													
Ans.	3	3	4	3	2	2	4													