1.

The ionisation potential of hydrogen atom is

(1) 13.60 volt (2) 8.24 volt

(3) 10.36 volt (4) 14.24 bolt

2.

Ionisation potential of hydrogen atom is 13.6 eV. Hydrogen atoms in the ground state are excited by monochromatic radiation of photon energy 12.1 eV. According to Bohr's theory, the spectral lines emitted by hydrogen will be [2006]

(1) two (2) three (3) four (4) one

3.

Consider the spectral line resulting from transition n = 2 to n = 1 in the atoms and ions given below. The shorterst wavelength is given by

(1) Hydrogen atom

(2) Deuterium

(3) Singly ionised helium

(4) Doubly ionised lithium

4.

Light is a kind of wave. The wavelength of visible light ranges from about 4000 $\mathring{A}$ to 7000 $\mathring{A}$. Which of the following statements is false?

(A) Ultraviolet light has a wavelength shorter than 4000 $\mathring{A}$

(B) Infrared light has a wavelength longer than 7000 $\mathring{A}$

(C) Red light has wavelength near about 7000 $\mathring{A}$

(D) Violet light has wavelength near about 7000 $\mathring{A}$.

5.

An $\alpha-$particle of energy 5 MeV is scattered through 180° by a fixed uranium nucleus. The distance of closest approach is of the order

(1) $10^{-10}\ m$ (2) $10^{-13}\ m$ (3) $10^{-14}\ m$ (4) $10^{-16}\ m$

6.

Energy of an electron in an excited hydrogen atom is -3.4 eV. Its angular momentum will be (h = 6.626 $\times$ 10^{-34} J-s)

(a) 1.11 $\times$ 10^{34} J s (b) 1.51 $\times 10^{-31}$ J s

(c) 2.11 $\times$ 10^{-34} J s (d) 3.72 $\times$ 10^{-34} J s

7.

When a hydrogen atom is raised from the ground state to an excited state [1995]

(a) PE decreases and KE increases

(b) PE increases and KE decreases

(c) both KE and PE decrease

(d) absorption spectrum

8.

The wavelength of K_a X-rays produced by an X-ray tube is 0.76 $\mathring{A}$. Find the atomic number of the anode material of the tube?

(A) 41 (B) 30

(C) 20 (D) 10

9.

Energy levels A, B, C of a certain atom correspond to increasing values of energy i.e. $E_A < E_B < E_C$. If λ_1, λ_2, λ_3 are the wavelengths of radiation corresponding to the transitions C to B, B to A and C to A respectively, which of the following relation is correct ? [1990]

(1) $\lambda_3 = \lambda_1 + \lambda_2$ (2) $\lambda_3 = \frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}$

(3) $\lambda_1 + \lambda_2 + \lambda_3 = 0$ (4) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

10.

The velocity of electron in ground state (H - atom) is

(1) $2 \times 10^5\ m/s$ (2) $2 \times 10^6\ m/s$

(3) $2 \times 10^7\ m/s$ (4) $2 \times 10^8\ m/s$

11.

Atoms having different atomic number as well as different mass number but having same number of neutrons

(A) isotopes (B) isobars

(C) isotones (D) isodiaphers

12.

Which of the following transitions gives photon of maximum energy? [2000]

(1) n = 1 to n = 2 (2) n = 2 to n = 1

(3) n = 2 to n = 6 (4) n = 6 to n = 2

13.

When electron jumps from n = 4 to n = 2 orbit, we get [2000]

(1) second line of Lyman series

(2) second line of Balmer series

(3) second line of Paschen series

(4) an absorption line of Balmer series

14.

In terms of Bohr radius a_0, the radius of the second Bohr orbit of a hydrogen atom is given by [1992]

(1) $4a_0$ (2) $8a_0$ (3) $\sqrt{2}a_0$ (4) $2a_0$

15.

The energy of lowest state of hydrogen is -13.6 eV. The ionisation energy of first excited state will be

(A) 13.6 eV (B) 4.2 eV

(C) 6.8 eV (D) 3.4 eV

16.

A diatomic molecule is made of two masses m_1 *and* m_2 which are separated by a distance r. If we calculate its rotational energy by applying Bohr's rule of angular momentum quantization, its energy will be given by (n is an integer) : [AIEEE 2012]

(1) $\frac{(m_1+m_2)^2 n^2h^2}{2m_1^2m_2^2r^2}$ (2) $\frac{n^2h^2}{2\pi^2(m_1+m_2)r^2}$

(3) $\frac{2n^2h^2}{(m_1+m_2)r^2}$ (4) $\frac{(m_1+m_2)n^2h^2}{8\pi^2m_1m_2r^2}$

17.

In the Bohr's hydrogen atom model, the radius of the stationary orbit is directly proportional to (n = principal quantum number) [CBSE PMT 1996; AIIMS 199; DCE 2002; AMU (med.) 2010)

(1) n^{-1} (2) n (3) n^{-2} (4) n^2

18.

The Bohr model of atoms [2004]

(1) assumes that the angular momentum of electrons is quantised

(2) uses Einstein's photoelectric equation

(3) Predicts continuous emission spectra for atoms

(4) Predicts the same emission spectra for all types of atoms

19.

When a hydrogen atom is raised from the ground state to excited state

(1) both KE and PE increase

(2) both KE and PE decrease

(3) PE increases and KE decreases

(4) PE decreases and KE increases

20.

A hydrogen atom is in an excited state of principal quantum number (n), it emits a photon of wavelength (λ), when it returns to the ground state. The value of n is

(1) $\sqrt{\frac{\lambda R}{\lambda R-1}}$ (2) $\sqrt{\frac{(\lambda R-1)}{\lambda R}}$

(3) $\sqrt{\lambda(R-1)}$ (4) None of these

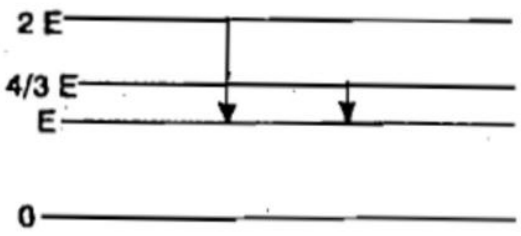
21.

The ground state energy of H-atom is 13.6 eV. The energy needed to ionise H-atom from its second excited state [1991]

(1) 1.51 eV (2) 3.4 eV (3) 13.6 eV (4) 12.1 eV

22.

The given diagram indicates the energy levels of a certain atom. When the system moves from 2E level to E, a photon of wavelength λ is emitted. The wavelength of photon produced during its transition from $\frac{4E}{3}$ level to E is



(1) $\frac{\lambda}{3}$ (2) $\frac{3\lambda}{4}$ (3) $\frac{4\lambda}{3}$ (4) 3λ

23.

Energy E of a hydrogen atom with principal quantum number n is given by $E=\frac{-13.6}{n^2}eV$. The energy of a photon ejected when the electron jumps from n = 3 state to n = 2 state of hydrogen, is approximately [2004]

(1) 1.5 eV (2) 0.85 eV (3) 3.4 eV (4) 1.9 eV

24.

The energy of ground electronic state of hydrogen atom

is -13.6 eV. The energy of the first excited state will be [1997]

(1) -54.4 eV (2) -27.2 eV (3) -6.8 eV
(4) -3.4 eV

25.

If an electron in an hydrogen atom jumps from an orbit $n_i = 3$ to an orbit with level $n_f = 2$, the frequency of the emitted radiation is

(1) $v = \frac{36\,C}{5\,R}$ (2) v = $\frac{CR}{6}$ (3) v = $\frac{5\,RC}{36}$
(4) v = $\frac{6\,C}{R}$

26.

The energy of a hydrogen atom in its ground state is -13.6 eV. The energy of the level corresponding to the quantum number n = 5 is

(1) - 0.54 eV (2) - 5.40 eV (3) - 0.85 eV
(4) -2.72 eV

27.

Which of the following transition in a hydrogen atom will produce radiations of minimum wavelength

1. n = 2 to n = 1
2. n = 5 to n = 3
3. n = 10 to n = 5
4. n = 10 to n = 3

28.

When the electron of a hydrogen-like atom jumps from a higher energy level to a lower energy level, then

1. Angular momentum of the electron remains constant
2. The kinetic energy of the electron increases
3. The wavelength of the de-Broglie wave associated with the motion of the electron increases
4. Potential energy increases

29.

When neutron moving with Kinetic Energy 2eV collies with stationary H11 in ground state, the collision will be:

1. Must be elastic
2. may be inelastic
3. Both
4. Must be perfectly inelastic

30.

The ratio of areas within the electron orbits for the first excited state to the ground state for hydrogen atom is

(a) 16 : 1 (b) 18 : 1
(c) 4 : 1 (d) 2 : 1

31.

The ground state energy of hydrogen atom is – 13.6 eV. What is the potential energy of the electron in this state

(a) 0 eV (b) – 27.2 eV
(c) 1 eV (d) 2 eV

32.

The ratio of the speed of the electrons in the ground state of hydrogen to the speed of light in vacuum is

(a) 1/2 (b) 2/137
(c) 1/137 (d) 1/237

33.

A hydrogen atom in its ground state absorbs 10.2 eV of energy. The orbital angular momentum is increased by

(a) 1.05×10^{-34} J-sec (b) 3.16×10^{-34} J-sec
(c) 2.11×10^{-34} J-sec (d) 4.22×10^{-34}J-sec
(Given Planck constant h = 6.6×10^{-34} J-sec)

34.

In which of the following systems radius of the first orbit will (n = 1) be minimum?

(1) Doubly ionized lithium

(2) Singly ionized

(3) Deuterium atom

(4) Hydrogen atom

35.

The total energy of the electron in the ground state of hydrogen atom is $-13.6\,eV$. The kinetic energy of an electron in the first excited state is

(1) 6.8 eV

(2) 13.6 eV

(3) 1.7 eV

(4) 3.4 eV

36.

The ground state energy of hydrogen atom is -13.6

eV. When its electron is in the first excited state, its excitation energy is

(1) 0

(2) -3.4 eV

(3) 6.8 eV

(4) 10.2 eV

37.

The ionization energy of the electron in the hydrogen atom in its ground state is 13.6 eV. The atoms are excited to higher energy levels to emit radiations of 6 wavelengths. Maximum wavelength of emitted radiation corresponds to the transition between

(1) n = 3 to n = 1 states

(2) n = 2 to n = 1 states

(3) n = 4 to n = 3 states

(4) n = 3 to n = 2 states

38.

Out of the following which one is not possible energy for a photon to be emitted by a hydrogen atom according to the Bohr's atomic model?

(1) 0.65 eV

(2) 1.9 eV

(3) 11.1 eV

(4) 13.6 eV

39.

Electron in hydrogen atom first jumps from third excited state to second excited state and then from second excited to the first excited state. The ratio of the wavelength $\lambda_1 : \lambda_2$ emitted in the two cases is

(1) 7/5

(2) 27/20

(3) 27/5

(4) 20/7

40.

Monochromatic radiation emitted when electron in hydrogen atom jump from first excited to the ground state irradiates a photosensitive material. The stopping potential is measured to be 3.57 V. The threshold frequency of the material is

(1) $4 \times 10^{15}\ Hz$

(2) $5 \times 10^{15}\ Hz$

(3) $1.6 \times 10^{15}\ Hz$

(4) 2.5×10^{15} Hz

41.

The transition from the state n = 3 to n = 1 in hydrogen like atom results in ultraviolet radiation. Infrared radiation will be obtained in the transition from

(1) 4→2

(2) 4→3

(3) 2→1

(4) 3→2

42.

Ratio of longest wavelengths corresponding to Lyman and Balmer series in hydrogen spectrum is

(1) $\frac{5}{27}$

(2) $\frac{3}{23}$

(3) $\frac{7}{29}$

(4) $\frac{9}{31}$

43.

Hydrogen atom in ground state is excited by a monochromatic radiation of $\lambda = 975\ \overset{0}{A}$. Number of spectral lines in the resulting spectrum emitted will be

(1) 3

(2) 2

(3) 6

(4) 10

44.

If an electron in a hydrogen atom jumps from the 3rd orbit to the 2nd orbit, it emits a photon of wavelengthλ. When it jumps from the 4th orbit to the 3rd orbit, the corresponding wavelength of the photon will be

(1) $\frac{9}{16}\lambda$

(2) $\frac{20}{7}\lambda$

(3) $\frac{20}{13}\lambda$

(4) $\frac{16}{25}\lambda$

45.

The ratio of kinetic energy to the total energy of an electron in a a Bohr orbit of the hydrogen atom, is

(1) 2: - 1

(2) 1: - 1

(3) 1:1

(4) 1: - 2

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