PHYSICS

BOOKS - NEET PREVIOUS YEAR (YEARWISE + CHAPTERWISE)

ATOMIC PHYSICS

Atomic Physics

1. Radioactive material 'A' has decay constant '8λ' and material 'B' has decay constant

'lamda'. Initial they have same number of nuclei. After what time, the ratio of number of nuclei of material 'B' to that 'A' will be $\frac{1}{e}$?

A. $\frac{1}{\lambda}$

B. $\frac{1}{7\lambda}$

C. $\frac{1}{8\lambda}$

D. $\frac{1}{9\lambda}$

Answer: B

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2. The ratio of wavelength of the lest line of Balmer series and the last line Lyman series is:

A. 2

B. 1

C. 4

D. 0.5

Answer: C

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

A. $\frac{16}{25}\lambda$

B. $\frac{9}{16}\lambda$

C. $\frac{20}{7}\lambda$

D. $\frac{20}{13}\lambda$

Answer: C

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4. A proton and an alpha particle both enters a region of uniform magnetic field B, moving at right angles to the field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by proton is $1MeV$, the energy acquired by the alpha particles will be :

A. 4 MeV

B. 0.5 MeV

C. 1.5 MeV

D. 1 MeV

Answer: D

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5. In the spectrum of hydrogen atom, the ratio of the longest wavelength in Lyman series to the longest wavelength in the Balmer series is:

A. $\frac{4}{9}$

B. $\frac{9}{4}$

C. $\frac{27}{5}$

D. $\frac{5}{27}$

Answer: D

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6. Consider $3rd$ orbit of He^+ (Helium) using nonrelativistic approach the speed of electron in this orbit will be (given $K = 9 \times 10^9$

constant $Z = 2$ and h (Planck's constant) $= 6.6 \times 10^{-34} Js.$)

A. $2.92 \times 10^{6} m/s$

B. $1.46 \times 10^{6} m/s$

C. $0.73 \times 10^{6} m/s$

D. $3.0 \times 10^{8} m/s$

Answer: B

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

A. 3

B. 2

C. 6

D. 10

Answer: C

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8. In the spectrum of hydrogen atom, the ratio of the longest wavelength in Lyman series to the longest wavelength in the Balmer series is:

A. $\frac{5}{27}$

B. $\frac{3}{23}$

C. $\frac{7}{29}$

D. $\frac{9}{31}$

Answer: A

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

A. $7/5$

B. $27/20$

C. $27/5$

D. $20/7$

Answer: D

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10. An electrons of a stationary hydrogen aton passes form the fifth enegry level to the ground level. The velocity that the atom acquired as a result of photon emission will be (m is the mass of the electron, R, Rydberg constanrt and h, Planck's constant)

A. $\frac{24\mathrm{h\ R}}{25m}$

B. $\frac{25\text{h R}}{24m}$

C. $\frac{25m}{24\text{h R}}$

D. $\frac{24m}{25\text{h R}}$

Answer: A

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11. The wavelength of the first line of Lyman series for hydrogen atom is equal to that of the second line of Balmer series for a

hydrogen-like ion. The atomic number Z of hydrogen-like ion is

A. 4

B. 1

C. 2

D. 3

Answer: C

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12. The energy of a hydrogen atom in the ground state is $-13.6eV$. The eneergy of a He^{+} ion in the first excited state will be

A. -13.6 eV

B. -27.2 eV

C. -54.5 eV

D. -6.8 eV

Answer: A

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

A. n = 3 to n = 2 states

B. n = 3 to n = 1 states

C. n = 2 to n = 1 states

D. n = 4 to n = 3 states

Answer: D

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14. In a Rutherford scattering experiment when a projectile of change Z_1 and mass M_1 approaches s target nucleus of change Z_2 and mass M_2, te distance of closed approach is r_0. The energy of the projectile is

A. directly proportional to $M_1 \times M_2$

B. directly proportional to $Z_1 Z_2$

C. inversely proportional to Z_1

D. Directly proportional to mass M_1

Answer: B

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15. The groud state energy of hydrogen atom is $-13.6eV$. When its electron is in first excited state, its exciation energy is

A. 3.4 eV

B. 6.8 eV

C. 10.2 eV

D. zero

Answer: C

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

A. 3.4 eV

B. 6.8 eV

C. 13.6 eV

D. 1.7 eV

Answer: A

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17. Ionization potential of hydrogen atom is $13.6V$. Hydrogen atoms in the ground state are excited by monochromatic radiation of

photon energy $12.1eV$. The spectral lines emitted by hydrogen atoms according to Bohr's theory will be

A. two

B. three

C. four

D. one

Answer: B

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18. The total energy of the electron in the first excited state of hydrogen is $-3.4eV$. What is the kinetic energy of the electron in this state?

A. -3.4 eV

B. -6.8 eV

C. 6.8 eV

D. 3.4 eV

Answer: D

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19. Energy E of a hydrogen atom with principle 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

A. 1.5 eV

B. 0.85 eV

C. 3.4 eV

D. 1.9 eV

Answer: D

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20. The Bohr model of atoms

A. assumes that the angular momentum of electrons is quantised

B. uses Einstein's photoelectric equation

C. predicts continuous emission spectra for atoms

D. predicts the same emission spectra for all types of atoms

Answer: A

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21. Which of the following transitions in a hydrogen atom emits photon of the highest frequency ?

A. n = 1 to n = 2

B. n = 2 to n = 1

C. n = 2 to n = 6

D. n = 6 to n = 2

Answer: B

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22. When electron jumps from n = 4 to n = 1 orbit, we get

A. second line of Lyman series

B. second line of Balmer series

C. second line of Paschen series

D. an absorption line of Balmer series

Answer: B

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23. In the Bohr model of a hydrogen atom, the centripetal force is furnished by the Coulomb attraction between the proton and the electrons. If a_0 is the radius of the ground

state orbit, m is the mass and e is the charge on the electron and e_0 is the vacuum permittivity, the speed of the electron is

A. zero

B. $\frac{e}{\sqrt{\varepsilon_0 a_0 m}}$

C. $\frac{e}{\sqrt{4\pi\varepsilon_0 a_0 m}}$

D. $\frac{\sqrt{4\pi\varepsilon_0 a_0 m}}{e}$

Answer: C

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24. The groud state energy of hydrogen atom is $-13.6eV$. When its electron is in first excited state, its exciation energy is

A. -54.4 eV

B. -27.2 eV

C. -6.8 eV

D. -3.4 eV

Answer: D

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25. When hydrogen atom is in first excited level, its radius is....its ground state radius

A. four times, its gound state radius

B. twice, its gound state radius

C. same as its ground sate radius

D. half of its ground state radius

Answer: A

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26. when a hydrogen atom is raised from the ground state to an excited state

A. PE decreases and KE increases

B. PE increases and KE decreases

C. both KE and PE decrease

D. absorption spectrum

Answer: C

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27. The spectrum obtained from a sodium vapour lamp is an example of

A. band spectrum

B. continuous spectrum

C. emission spectrum

D. absorption spectrum

Answer: C

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28. The radius of hydrogen atom in its ground state is $5.3 \times 10^{-11} m$. After collision with an electron it is found to have a radius of $21.2 \times 10^{-11} m$. What is the principle quantum number of n of the final state of the atom ?

A. n = 4

B. n = 2

C. n = 16

D. n = 3

Answer: B

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29. In Rutherford scattering experiment, what will b ethe correct angle for α scattering for an impact parameter $b = 0$?

A. 90°

B. 270°

C. 0°

D. 180°

Answer: D

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30. Hydrogen atoms are excited from ground state of the principle quantum number 4. Then the number of spectral lines observed will be

A. 3

B. 6

C. 5

D. 2

Answer: B

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31. Which source is associated with a line emission spectrum?

A. Electric fire

B. Neon street sign

C. Red traffic light

D. Sun

Answer: B

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32. The ionisation energy of hydrogen atom is $13.6eV$. Following Bohr's theory, the energy corresponding to a transition between the 3rd and the 4th orbit is

A. 3.40 eV

B. 1.51 eV

C. 0.85 eV

D. 0.66 eV

Answer: D

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33. In terms of Bohr radius a_0, the radius of the second Bohr orbit of a hydrogen atom is given by

A. $4a_0$

B. $8a_0$

C. $\sqrt{2}a_0$

D. 2 a_0

Answer: A

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34. Ground state energy of H-atom is -13.6 eV. The energy needed to ionise H-atom from its second excited state is

A. 1.51 eV

B. 3.4 eV

C. 13.6 eV

D. 12.1 eV

Answer: A

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35. Consider an eelctron in the nth orbit of a hydrogen atom in the Bohr model. The circumference of the orbit can be expressed in

terms of the de Broglie wavelength λ o fthat electron as

A. $(0.529)n\lambda$

B. $\sqrt{n\lambda}$

C. $(13.6)\lambda$

D. $n\lambda$

Answer: D

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36. The valence electron in alkali metal is a

A. f-electron

B. p-electron

C. s-electron

D. d-electron

Answer: C

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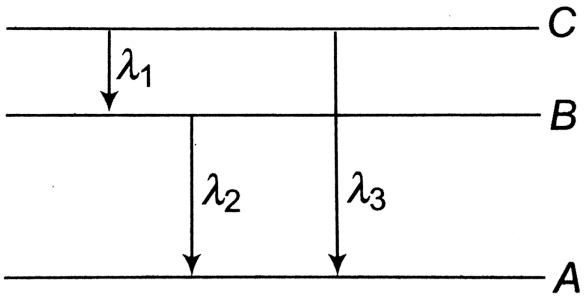
37. Energy levels A, B, C of a certain atom corresponding to increasing values of energy i.e., $E_A < E_B < E_C$. If $\lambda_1, \lambda_2, \lambda_3$ are the wavelengths of radiations correspnding to the transitions C to B, B to A and C to A respectively, which o fthe following statements is correct?



A. $\lambda_3 = \lambda_1 + \lambda_2$

B. $\lambda_3 = \dfrac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$

C. $\lambda_1 + \lambda_2 + \lambda_3 = 0$

D. $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

Answer: B

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38. To explain his theory, Bohr used

A. conservation of linear momentum

B. conservation of angular momentum

C. conservation of quantum frequency

D. conservation of energy

Answer: B

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39. The ionization energy of hydrogen atom is 13.6 eV. Calculate Rydberg's constant for hydrogen.

A. 13.6 eV

B. 27.2 eV

C. 6.8 eV

D. 54.4 eV

Answer: D

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