

Chemistry [DPP]

Atomic Structure

DPP - 9

DPP-9

1. First and second excitation potentials of hydrogen atom (in eV) would be respectively
(A) 10.2, 12.1 (B) 12.1, 10.2
(C) 13.6, 3.4 (D) 3.4, 13.6
2. The separation energy of the electron present in the shell $n = 3$ is 1.51 eV. What is the energy in the first excited state ?
(A) -1.51eV (B) -3.4eV
(C) +1.51 (D) +3.eV
3. The radius of hydrogen atom in its ground state is 5.3×10^{-11} m. After collision with an electron it is found to have a radius of 21.2×10^{-11} m. What is the principal quantum number, n of the final state of the atom ?
(A) $n = 2$ (B) $n = 3$
(C) $n = 4$ (D) $n = 16$

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4. The energy required for the ionization of excited hydrogen atom would be (in eV)-
(A) 13.6 (B) >13.6
(C) <13.6 (D) None of these
5. What is the potential energy of the electron in the L-shell of the hydrogen atom?
(A) -13.6eV (B) -6.8eV
(C) -10.2eV (D) -3.4eV
6. For ionising an excited hydrogen atom, the required in eV will be-
(A) 3.4 or less
(B) More than 13.6
(C) Little less than 13.6
(D) 13.6

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7. If the electron jumps from 7.00eV energy level to 5.0eV energy level, it:
- (A) Absorbs 2.0eV kinetic energy
 - (B) Absorbs 2.0eV potential energy
 - (C) Emits 2.0eV electrical energy
 - (D) Emits 2.0eV photon
8. Photon of the nmaximum frequency will be absorbed in the transition (for H atom):
- (A) From $n = 1$ to $n = 4$
 - (B) From $n = 2$ to $n = 1$
 - (C) From $n = 2$ to $n = 3$
 - (D) From $n = 3$ to $n = 2$

9. Supposing the energy (in arbitrary units) of the energy levels in the hydrogen atom is given as under:

Energy level	K	L	M	N...
	n=1	n=2	n=3	n=4...n=∞
Energy	-864au.			Zero

the excitation energy needed to raise the electron from M level to $n = \infty$ would be :

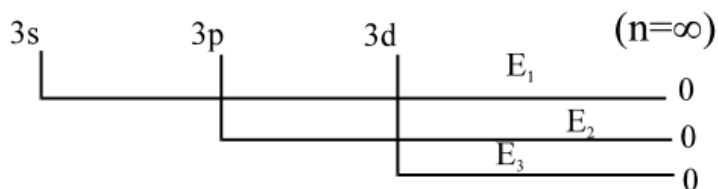
- (A) 192 (B) 96
(C) 188 (D) 384
10. Circumference of the first orbit of hydrogen atom is given by the formula:

- (A) $\frac{22}{7}\alpha_0$ (B) $\frac{\pi\alpha_0}{2}$
(C) $\sqrt{4\pi}\alpha_0$ (D) $\pi\alpha_0$

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- 11.** When an electron moves from L-shell to M-shell, then it will be accompanied by:
- (A) Energy absorption
 - (B) Energy emission
 - (C) gamma-ray emission
 - (D) gamma-ray absorption
- 12.** When the electron passes from energy state nearest to the nucleus to third energy level, it will :
- (A) Emit one quantum of energy
 - (B) Absorb one quantum of energy
 - (C) Emit two quantum of energy
 - (D) Absorb two quantum of energy

- 13.** Evaluate the following ratios for the energy of the electron in a particular orbit :
[Kinetic : Potential] and [Total : Kinetic]
(A) [1 : -2] and [-1 : 1]
(B) [1 : 2] and [1 : 1]
(C) [1 : 1] and [1 : 2]
(D) [1 : 2] and [1 : 2]
- 14.** If the I.E. of He^+ is 54.4 eV then -
(A) I.E. of H is 13.6 eV and that of Li^{+2} is 122.4 eV
(B) I.E. of H is 13.6 eV and that of Li^{+2} cannot be determined
(C) I.E. of H is 13.6 eV and that of Li^{+2} is 27.2 eV
(D) All of the above are wrong

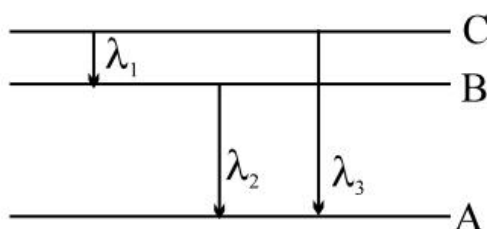
- 15.** For H-atom, the energy required for the removal of electron from various sub-shells is given as under:



The order of the energies would be :

- (A) $E_1 > E_2 > E_3$ (B) $E_3 > E_2 > E_1$
 (C) $E_1 = E_2 = E_3$ (D) None of these
- 16.** The ionization potential of hydrogen atom is 13.6 eV. The energy required to remove an electron from the $n = 2$ state of hydrogen atom is :
- (A) 27.2 eV (B) 13.6 eV
 (C) 6.8 eV (D) 3.4 eV

- 17.** Energy levels A, B, C of a certain atom corresponds to increasing values of energy, *i.e.*, $E_A < E_B < E_C$. If λ_1, λ_2 and λ_3 are the wavelength of radiations corresponding to the transitions C to B, B to A and C to A respectively, which of the following statement is correct :



- (A) $\lambda_3 = \lambda_1 + \lambda_2$
- (B) $\lambda_3 = \frac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$
- (C) $\lambda_1 + \lambda_2 + \lambda_3 = 0$
- (D) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

ANSWER KEY

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|-----|---|-----|---|-----|---|
| 1. | A | 2. | B | 3. | A |
| 4. | C | 5. | B | 6. | A |
| 7. | D | 8. | A | 9. | B |
| 10. | C | 11. | A | 12. | B |
| 13. | A | 14. | A | 15. | C |
| 16. | D | 17. | B | | |