Structure of Atom

Q.No.1:

Energy of an electron is given by $E = -2.178 \times 10^{-18} J \left(\frac{Z^2}{n^2}\right)$. Wavelength of light required to excite an electron in an hydrogen atom from level n = 1 to n = 2 will be :
(h = 6.62 × 10^{-34})Js and c = 3.0 × 10^{8} ms^{-1})

JEE 2013

A. 1.214 ×10^{-7} m
B. 2.816 ×10^{-7} m
C. 6.500 ×10^{-7} m
D. 8.500 ×10^{-7} m

Q.No.2: The correct set of four quantum numbers for the valence electrons of rubidium atom (Z = 37) is

A. 5, 1, 1, + $\frac{1}{2}$
B. 5, 0, 1, + $\frac{1}{2}$
C. 5, 0, 0, + $\frac{1}{2}$
D. 5, 1, 0, + $\frac{1}{2}$

Q.No.3: Which of the following is the energy of a possible excited state of hydrogen?

JEE 2015

A. +13.6 eV
B. −6.8 eV
C. −3.4 eV
D. +6.8 eV

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Q.No.4: A stream of electrons from a heated filament was passed between two charged plates kept at a potential difference *V* esu. If *e* and *m* are charge and mass of an electron, respectively, then the value of $\frac{h}{\lambda}$ (where λ is wavelength associated with electron wave) is given by: **JEE 2016**

A. 2 *meV*

B. $\sqrt{meV}$

C. $\sqrt{2meV}$

D. *meV*

Q.No.5: For emission line of atomic hydrogen from n_i = 8 to n_i = *n*, the plot of wave number $(\bar{v})$ against $\left(\frac{1}{n^2}\right)$ will be (The Rydberg constant, R_H is in wave number unit) **JEE 2019**

A. Linear with intercept – R_H

B. Non linear

C. Linear with slope R_H

D. Linear with slope – R_H

Q.No.6: Which of the following combination of statements is true regarding the interpretation of the atomic orbitals?
(a) An electron in an orbital of high angular momentum stays away from the nucleus than an electron in the orbital of lower angular momentum.
(b) For a given value of the principal quantum number, the size of the orbit is inversely proportional to the azimuthal quantum number.
(c) According to wave mechanics, the ground state angular momentum is equal to $\frac{h}{2\pi}$.
(d) The plot of Ψ Vs *r* for various azimuthal quantum numbers, shows peak shifting towards higher *r* value. **JEE 2019**

A. (a), (d)

B. (a), (b)

C. (a), (c)

D. (b), (c)

Q.No.7: Which of the graphs shown below does not represent the relationship between incident light and the electron ejected from metal surface? **JEE 2019**

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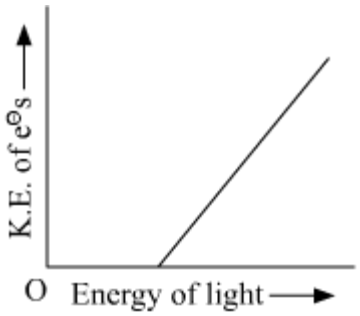
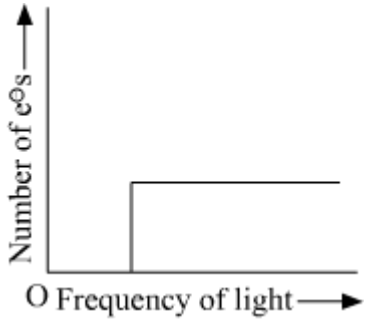
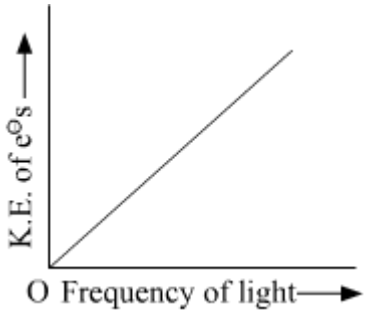
A.



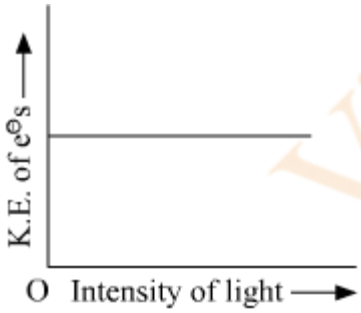
B.



C.



D.



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Q.No.8: The ground state energy of hydrogen atom is – 13.6 eV. The energy of second excited state of He^+ ion in eV is: **JEE 2019**

A. – 54.4

B. – 3.4

C. – 6.04

D. – 27.2

Q.No.9: The de Broglie wavelength (λ) associated with a photoelectron varies with the frequency (v) of the incident radiation as, [v_0 is threshold frequency]:

A. $\lambda \propto \frac{1}{(v-v_0)}$ **JEE 2019**

B. $\lambda \propto \frac{1}{(v-v_0)^{\frac{1}{4}}}$

C. $\lambda \propto \frac{1}{(v-v_0)^{\frac{3}{2}}}$

D. $\lambda \propto \frac{1}{(v-v_0)^{\frac{1}{2}}}$

Q.No.10: Heat treatment of muscular pain involves radiation of wavelength of about 900 nm. Which spectral line of H-atom is suitable for this purpose? [$R_H = 1 \times 10^5$ cm^{-1}, $h = 6.6 \times 10^{-34}$ Js, $c = 3 \times 10^8$ ms^{-1}] **JEE 2019**

A. Paschen, $\infty \rightarrow 3$

B. Paschen, $5 \rightarrow 3$

C. Balmer, $\infty \rightarrow 2$

D. Lyman, $\infty \rightarrow 1$

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