



STRUCTURE OF ATOM (DUPLICATE)

Class 11 - Chemistry

Time Allowed: 1 hour and 29 minutes

Maximum Marks: 40

1. An electron beam on hitting a ZnS screen produces a scintillation on it. What do you conclude? [1]
2. What did Einstein explain about photoelectric effect? [1]
3. Explain why the uncertainty principle is significant only for the motion of subatomic particles but is negligible for the macroscopic objects? [1]
4. What is the nuclear radius of an atom whose mass number is 125? [1]
5. How does the intensity of the spectral line vary with wavelength? [1]
6. Why did Heisenberg replace the concept of definite orbits by the concept of probability? [1]
7. Which two discoveries put a strong challenge to the Bohr model? [1]
8. What is value of Planck's constant in S.I. units? [1]
9. Why electronic energy is negative? Comment on the spacing between the energy levels? [1]
10. What is the most important application of de Broglie concept? [1]
11. The effect of uncertainty principle is significant only for motion of microscopic particles within an accuracy of 4% what will be the uncertainty in speed and position? [3]
12. Emission transitions in the Paschen series end at orbit $n = 3$ and start from orbit n and can be represented as $\nu = 3.29 \times 10^{15} \text{ (Hz) } [1/3^2 - 1/n^2]$ Calculate the value of n if the transition is observed at 1285 nm. Find the region of the spectrum. [3]
13. Which of the following sets of orbitals are degenerate and why? [3]
 1. 1s, 2s and 3s in Mg atom
 2. $2p_x$, $2p_y$ and $2p_z$ in C atom
 3. 3s, $3p_x$ and 3d orbitals in H atom
14. Calculate the wavelength of the spectral line obtained in the spectrum of Li^{2+} ion when the transition takes place between two levels whose sum is 4 and the difference is 2. [3]
15.
 - i. The energy associated with first orbit in hydrogen atom is -2.17×10^{-18} . [3]
 - ii. What is the energy associated with the fifth orbit?
 - iii. Calculate the radius of Bohr's fifth orbit for the hydrogen atom.
16. Indicate the number of unpaired electrons in: [5]
 - i. P
 - ii. Si
 - iii. Cr
 - iv. Fe and
 - v. Kr.
17. Find energy of each of the photons which: [5]

- i. correspond to light of frequency 3×10^{15} Hz.
- ii. have wavelength of $0.50 \text{ \AA}$.
18. i. Calculate the total number of electrons present in one mole of methane. [5]
- ii. Find (a) the total number and (b) the total mass of neutrons in 7 mg of ^{14}C . (Assume that mass of a neutron = 1.675×10^{-27} kg).
- iii. Find (a) the total number and (b) the total mass of protons in 34 mg of NH_3 at STP.
- Will the answer change if the temperature and pressure are changed?

Saitechinfo