CBSE TEST PAPER-03

CLASS - XI CHEMISTRY

(Structure of Atom

General Instruction:

- All questions are compulsory.
- Marks are given alongwith their questions.

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1. Give the range of wavelength of the visible spectrum. [1]
2. State the two developments that led to the formation of Bohr's model of atom. [1]
3. What is an electromagnetic radiation? [1]
4. Calculate the wavelength corresponding to a frequency of 98.8MHz. [2]
5. Define black body radiation. [1]
6. Define quantum. [1]
7. Give the relation of energy (E) and frequency (v) as given by Planck. [2]
8. Calculate the frequency and energy of a photon of radiation having wavelength 3000 $\overset{0}{A}$. [2]
9. What did Planck's theory explain? [1]
10. On what frequency does the frequency from a black body depend? [1]

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CLASS - XI CHEMISTRY [ANSWERS]

Ans1. 400nm to 750nm

Ans2. (1) Dual character of the electromagnetic radiations i.e. wave like and particle like properties, and

(2) Atomic spectra explained only by assuming quantized electronic energy levels in atoms.

Ans3. When electrically charged particles moves under acceleration, alternating electrical and magnetic fields are produced and transmitted. These fields are transmitted in the form of wave called electromagnetic waves or radiations.

Ans4. Wavelength, $\lambda = \frac{c}{v}$

Substituting $c = 3 \times 10^8 m / \sec$

And $v = 98.7 MHz$

$= 98.7 \times 10^6 cyles / ses$

$\left(\because 1MHz = 10^6 cycles / \sec\right)$

$$\therefore \lambda = \frac{3 \times 10^8 m / \sec}{98.7 \times 10^6 / \sec} = 3.0395 m$$

Ans5. The ideal body, which emits and absorbs all frequencies, is called a black body and the radiation emitted by such a body is called black body radiation.

Ans6. Quantum is the smallest quantity of energy that can be emitted or absorbed in the form of electromagnetic radiation.

Ans7. The energy of quantum (E) is directly proportional to the frequency (v) of the radiation.

$E \alpha v$

$or, E = hv$

$or, E = \frac{hv}{\lambda}$ $where\ v = \frac{c}{\lambda} and$

$c = velocity\ and \lambda = wavelenght.$

'h' Planck's constant = $6.626 \times 10^{-34} JS.$

Ans8. (i) Frequency, $v = \frac{c}{\lambda}$

We know, $c = 3 \times 10^8 m/s$

$\lambda = 3000 \overset{0}{A} = 3000 \times 10^{-10} m.$

$\therefore \nu = \frac{3 \times 10^8 m/s}{3000 \times 10^{-10} m} = \frac{3 \times 10^8 m/s}{3 \times 10^3 \times 10^{-3}}$

$= \frac{1 \times 10^8}{1 \times 10^{-7}} \sec^{-1} = 1 \times 10^{15} \sec^{-1}$

(ii) Energy of the photon E = hv

We know, $E = 6.625 \times 10^{-34} \times 10^{15}$

$= 6.625 \times 10^{-19} joules$

Ans9. Planck was able to explain the distribution of intensity in the radiation from black body as function of frequency or wavelength at different temperature.

Ans10. The exact frequency distribution of the emitted radiation from a black body depends only on its temperature.