CLASS XI-CHEMISTRY

ATOMIC STRUCTURE

ASSIGNMENT-1

NUMERICAL QUESTIONS:

Q.1 How many unpaired electrons are there in each of the following in the ground state
(i) O (ii) O^+ (iii) O^- (iv) Fe (v) Mn.
(vi) S (vii) F (viii) Ar

Q.2 A certain dye absorbs 4530 Å and fluoresces at 5080 Å, these being wavelengths of maximum absorption that under given conditions 47% of the absorbed energy is emitted. Calculate the ratio of the no. of quanta emitted to the number absorbed.

Q.3 The energy of electron in hydrogen atom is given by $E_n = \frac{-21.7 \times 10^{-12}}{n^2}$ ergs. Calculate the energy required to remove an $\bar{e}$ completely from n = 2 orbit. What is the largest wavelength in cm of light that can be used to cause this transition.

Q.4 Find the ratio of radius of 2^{nd} orbit of it atom to 3^{rd} orbit of Li^{2+} ion

Q.5 Find the velocity of electron in 1^{st} & 2^{nd} orbit of He^+ ion and their ratio.

Q.6 Find the ratio of frequency of e^- in 1^{st} orbit of H atom to 3^{rd} orbit of He^+ ion.

Q.7 A hydrogen atom with an electron in the first shell (n = 1) absorbs UV light of a wavelength 1.03×10^{-7} m. To what shell does electron jumps ?

Q.8 H-atom is exposed to electromagnetic radiation of 1028 Å and gives out induced radiations. Calculate λ of induced radiations.

Q.9 For a broadcasted electromagnetic wave having frequency of 1200 KHz. Calculate the number of waves that will be formed in 1Km distance (wave number per Km)

Q.10 Visible spectrum contains light of following colours"violet-indigo-Blue-green-yellow- range-Red" (VIBGYOR). It's frequency ranges from violet (7.5×10^{14} Hz) to red (0.4×10^{14} Hz). Find out the maximum wavelength in this range.

Q.11 A photon of 300 nm is absorbed by a gas and then re-emitted two photons. One re-emitted photon has wavelength 500 nm. Calculate the energy of other photon re-emitted out.

Q.12 A metal was irradiated by light of frequency $2 \times 10^{15} s^{-1}$. The photoelectron produced had its KE, 2 times the K.E of photoelectron which was produced when the same metal was irradiated with a light of frequency $2 \times 10^{15} s^{-1}$. What is work function ?

Q.13 The critical wavelength for producing photoelectric effect in tungsten is 2600 Å. What wavelength would be necessary to produce photoelectrons from tungsten having twice the kinetic energy of these produced at 2200 Å?

Q.14 A certain particle carries 2.5×10^{-16}C of static electric charge. Calculate the number of electrons present in it.

Q.15 In Milikan's experiment, static electric charge on the oil drops has been obtained by shining X-rays. If the static electric charge on the oil drop is -1.282×10^{-18} C. Calculate the number of electrons present on it.

Q.16 4000 Å photon is used to break the iodine molecule, then the % of energy converted to the K.E. of iodine atoms if bond dissociation energy of I_2 molecule is 246.5 kJ/mol. (hc = 1240 eV– nm), (one mole = 6×10^{23} photon)

Q.17 Find out the number of waves made by a Bohr electron in one complete revolution in it's 3rd orbit.

Q.18 Number of spectral line when electron jump from 6th energy level to the level which produce UV radiation.

Q.19 4000 Å photon is used to break the iodine molecule, then the % of energy converted to the K.E. of iodine atoms if bond dissociation energy of I_2 molecule is 246.5 kJ/mol. (hc = 1240 eV– nm), (one mole = 6×10^{23} photon)

Q.20 Find the number of electron in chromium ($_{24}Cr$) which have orbital angular momentum equal to $\frac{h}{\sqrt{2}\pi}$.

Q.21 Find out the number of waves made by a Bohr electron in one complete revolution in it's 3rd orbit.

Q.22 A certain dye absorbs 4530 Å and fluoresces at 5080 Å, these being wavelengths of maximum absorption that under given conditions 47% of the absorbed energy is emitted. Calculate the ratio of the no. of quanta emitted to the number absorbed.

Q.23 The energy of electron in hydrogen atom is given by $E_n = \frac{-21.7 \times 10^{-12}}{n^2}$ ergs. Calculate the energy required to remove an $\bar{e}$ completely from n = 2 orbit. What is the largest wavelength in cm of light that can be used to cause this transition.

Q.24 A certain particle carries 2.5×10^{-16}C of static electric charge. Calculate the number of electrons present in it.

Q.25 In Milikan's experiment, static electric charge on the oil drops has been obtained by shining X-rays. If the static electric charge on the oil drop is -1.282×10^{-18} C. Calculate the number of electrons present on it.
