

21. A photon of light with wavelength 450nm falls on a metal surface. As a result photoelectrons are ejected with a velocity of 6.4×10^4 m/s. The work function is
 a) 4.8×10^{-19} J b) 4.6×10^{-19} J c) 4.4×10^{-19} J d) 4.2×10^{-19} J
22. Energy required to stop the ejection of electrons from Cu plate is 0.24 eV. The work function when radiation of wavelength 253.7 nm strikes the plate is
 a) 3.5 eV b) 4.65 eV c) 5.78 eV d) 4.8eV
23. A particle A moving with a certain velocity has a de Broglie wavelength of 1 \AA . If particle B has mass 25% of that of A and velocity 75% that of A, the deBroglie wavelength of B will be approximately
 (a) 1 \AA (b) 5.3 \AA (c) 3 \AA (d) 0.2 \AA
24. In two H atoms A and B the electrons move around the nucleus in circular orbits of radius r and $4r$ respectively. The ratio of the times taken by them to complete one revolution is
 (a) 1: 4 (b) 1 : 2 (c) 1 : 8 (d) 2 : 1
25. Kinetic energy of the electron in ground state is 13.6eV, the de Broglie wavelength of the electron is ($1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$)
 a) 3.3 \AA b) 4.5 \AA c) 5.2 \AA d) 6.3 \AA
26. The I.E. of hydrogen atom is 13.6 eV. The energy required to remove an electron from $n = 2$ state of hydrogen atom is
 a) 27.2 eV b) 13.6 eV c) 6.8 eV d) 3.4 eV
27. A certain metal when irradiate to light ($\nu = 3.2 \times 10^{16}$ Hz) emits photoelectrons with twice kinetic energy as did photo electrons when the same metal is irradiated by light ($\nu = 2.0 \times 10^{16}$ Hz). The ν_0 of metal is
 a) 1.2×10^{14} Hz b) 8×10^{15} Hz
 c) 1.2×10^{16} Hz d) 1.2×10^{12} Hz
28. The threshold wavelength of photoelectric effect of a metal is 230 nm. The kinetic energy of the photoelectron ejected from the surface by UV radiation emitted from the second longest wavelength for the downward transition of electron in Lyman series of the atomic spectrum of hydrogen ($R = 1.096 \times 10^7 \text{ m}^{-1}$) will be
 a) 1.07×10^{-18} J b) 1.937×10^{-18} J
 c) 2.058×10^{-19} J d) 8.63×10^{-19} J
29. The velocity with which an electron should travel so that its momentum is equal to that of a photon of wavelength 560 nm is
 a) 1100 m s^{-1} b) 1200 m s^{-1} c) 1300 m s^{-1} d) 1400 m s^{-1}
30. Uncertainty in the position of an electron (mass = 9.1×10^{-31} kg) moving with a velocity 300 m s^{-1} , accurate upto 0.001 %, will be
 a) 1.92×10^{-2} m b) 3.84×10^{-2} m c) 19.2×10^{-2} m d) 5.76×10^{-2} m

31. When a certain metal was irradiated with a light of frequency 3.2×10^{16} Hz, the photoelectrons had twice the kinetic energy as emitted when the same metal was irradiated with light of frequency 2.0×10^{16} Hz. The threshold frequency of the metal is
 a) 4×10^{15} Hz b) 1.2×10^{16} Hz c) 5.2×10^{16} Hz d) 8×10^{15} Hz
32. If the binding energy of electrons in a metal is 250 kJ mol^{-1} , the threshold frequency of the striking photons is
 a) $6.26 \times 10^{16} \text{ s}^{-1}$ b) $6.26 \times 10^{15} \text{ s}^{-1}$ c) $6.26 \times 10^{14} \text{ s}^{-1}$ d) $6.26 \times 10^{13} \text{ s}^{-1}$
33. If the energy difference between the ground state of an atom and its excited state is $4.4 \times 10^{-14} \text{ J}$, the wavelength of photon required to produce the transition.
 a) $2.26 \times 10^{-12} \text{ m}$ b) $1.13 \times 10^{-12} \text{ m}$
 c) $4.52 \times 10^{-16} \text{ m}$ d) $4.52 \times 10^{-12} \text{ m}$
34. The frequency of radiation emitted when the electron falls from $n = 4$ to $n = 1$ in a hydrogen atom will be (given ionisation energy of H = $2.18 \times 10^{-18} \text{ J / atom}$ and $h = 6.625 \times 10^{-34} \text{ Js}$)
 a) $1.03 \times 10^3 \text{ s}^{-1}$ b) $3.08 \times 10^{15} \text{ s}^{-1}$
 c) $2.0 \times 10^{15} \text{ s}^{-1}$ d) $1.54 \times 10^{15} \text{ s}^{-1}$
35. The dissociation energy of H_2 is $430.53 \text{ kJ mol}^{-1}$. If H_2 is exposed to radiation energy of wavelength 253.7 nm . What % radiant energy will be converted into kinetic energy.
 a) 8.68% b) 6.88% c) 7.68% d) 9.68%
36. Electromagnetic radiation of wavelength 242 nm is just sufficient to ionize sodium atom. Calculate the ionization energy of sodium in kJ mol^{-1}
 a) 499.5 kJ/mol b) 494.5 kJ/mol c) 545.5 kJ/mol d) 464.5 kJ/mol
37. Number of photons of light having a wavelength 4000 \AA are necessary to provide 1.00 J of energy is
 a) 4.965×10^{-19} b) 2.01×10^{18} c) 2.01×10^{-18} d) 4.965×10^{19}
38. The wavelength of the radiation which would cause the photo dissociation of chlorine molecule if the Cl – Cl bond energy is 243 kJ mol^{-1}
 a) $4.90 \times 10^{-8} \text{ m}$ b) 490 nm c) $49 \times 10^{-7} \text{ m}$ d) 490m
39. The electronic energy in II and III Bohr's orbit of H atom are -5.42×10^{-12} and $-2.41 \times 10^{-12} \text{ erg}$ respectively. The wavelength of the radiations when the electron jumps from III to II orbit for H atom is
 a) 5460 \AA b) 6321 \AA c) 6603 \AA d) 5890 \AA

40. The maximum kinetic energy of the photoelectrons is found to be 6.63×10^{-19} J, when the metal is irradiated with a radiation of frequency 2×10^{15} Hz. The threshold frequency of the metal is about:
 a) $1 \times 10^{15} \text{ s}^{-1}$ b) $2 \times 10^{15} \text{ s}^{-1}$ c) $3 \times 10^{15} \text{ s}^{-1}$ d) $1.5 \times 10^{15} \text{ s}^{-1}$
41. If an electron is moving with velocity 500 ms^{-1} , which is accurate up to 0.005% then calculate uncertainty in its position. [$h = 6.63 \times 10^{-34}$ Js, mass of electron = 9.1×10^{-31} kg]
 a) $1.4 \times 10^{-3} \text{ m}$ b) $1.9 \times 10^3 \text{ m}$ c) $1.9 \times 10^{-3} \text{ m}$ d) $2.9 \times 10^{-3} \text{ m}$
42. Which transition of the Hydrogen spectrum would have the same wave length as the Balmer transition, $n = 4$ to $n = 2$ of He^+ spectrum -
 (a) $n_2 = 2$ to $n_1 = 1$ (b) $n_2 = 3$ to $n_1 = 1$
 (c) $n_2 = 4$ to $n_1 = 2$ (d) $n_2 = 5$ to $n_1 = 3$
43. The minimum energy required to overcome the attractive forces electron and surface of Ag metal is 7.52×10^{-19} J. What will be the maximum K.E. of electron ejected out from Ag which is being exposed to U.V. light of $\lambda = 360 \text{ \AA}$
 (a) 36.38×10^{-19} Joule
 (b) 6.92×10^{-19} Joule
 (c) 57.68×10^{-19} Joule
 (d) 67.68×10^{-19} Joule
44. The number of radial nodes in 4s and 3p orbitals are respectively
 (a) 2, 0 (b) 3, 1 (c) 2, 2 (d) 3, 2
45. Two particles A and B are in motion. If the wavelength associated with particle A is $5 \times 10^{-8} \text{ m}$; calculate the wavelength associated with particle B if its momentum is half of A.
 (a) $5 \times 10^{-8} \text{ m}$ (b) 10^{-5} cm (c) 10^{-7} cm (d) $5 \times 10^{-8} \text{ cm}$
46. The ratio of $(E_2 - E_1)$ to $(E_4 - E_3)$ for the hydrogen atom is approximately equal to
 a) 10 b) 15 c) 17 d) 12
47. If λ_0 is the threshold wavelength of photoelectric emission, λ is the wavelength of light falling on the surface of metal and m is the mass of electron then velocity of ejected electrons is given by
 a) $\left[\frac{2h}{m} (\lambda_0 - \lambda) \right]^{1/2}$ b) $\left[\frac{2hc}{m} (\lambda_0 - \lambda) \right]^{1/2}$
 c) $\left[\frac{2hc}{m} \left(\frac{\lambda_0 - \lambda}{\lambda_0 \lambda} \right) \right]^{1/2}$ d) $\left[\frac{2h}{m} \left(\frac{1}{\lambda_0} - \frac{1}{\lambda} \right) \right]^{1/2}$

