Photoelectric Effect

Q 1. Find out the energy of a photon of green light of wavelength 5500Å.
Ans.1. 2.25eV.

Q 2. If the energy of a photon is 3.103 eV, then calculate the wave length.
Ans.2. 4000Å.

Q 3. Radiation of wavelength 2000Å falls on a metal plate having negligible work function. Calculate the energy of the emitted photo-electrons.
Ans.3. 6.206 eV.

Q 4. Radiations of wavelength 1000Å falls on a metal plate which has negligible work function. Calculate the energy of the emitted photo electrons.
Ans.4. 12.412 eV.

Q 5. Radiations of wavelength 6000Å fall on a metal plate. If the work function of the metal plate is 1.8 eV, then calculate the energy of the emitted photo electrons.
Ans.5. 0.268 eV.

Q 6. Radiations of wavelength 3500 Å fall on a metal plate. Calculate the energy of the emitted photo electrons, if the work function of the metal is 2.4 eV.
Ans.6. 1.17 eV.

Q 7. Radiations of wavelength 200Å ejects photo electrons from a plate whose work function is 2.22 eV. Calculate the energy of the emitted photo electrons.
Ans.7. 3.986 eV.

Q 8. In the above question calculate the maximum velocity of the emitted photo electrons.
Ans.8. 1.18×10^{6}m/sec.

Q 9. In the above question, if a magnetic field of induction 0.4×10^{-4} weber/m^2 is applied parallel to the plate, then calculate the radius of the circular path followed by the photo electrons emitted normally from the plate.
Ans.9. 16.78×10^{-2} metre.

Q 10. Radiations of wavelength 18×10^{-8} metre fall on a metal plate having work function 2eV. If a magnetic field of induction 0.5×10^{-4} weber/m^2 is applied parallel to the plate, then calculate the radius of the circular path followed by the photo electrons emitted normally from the plate.
Ans.10. 0.149 metre.

Q 11. The maximum velocity with which an electron is emitted from a photocell is 3.66×10^{6} m/sec. Calculate the stopping potential.
Ans.11. 38.09 volt.

Q 12. Radiations of wavelength 5000Å fall on a metal plate whose work function is 1.9 eV. Calculate the stopping potential.
Ans.12. 0.57 volt.

Q 13. Ultraviolet light of wavelength 1000A is incident on molybdenum (work function = 4.15 volt). Calculate the maximum velocity of the emitted photo electrons.

Ans.13. 1.7×10^6 m/sec.

Q 14. Calculate the energy of the incident radiation if the energy of the emitted photo electrons from a metal is 2.4 eV. The work function of the metal is 2.6 eV.
Ans.14. 5 eV.

Q 15. In the above question calculate the wavelength of the incident radiation.
Ans.15. 2482.5 Å.

Q 16. Calculate the threshold wavelength if the work function of a metal is 1.6 eV.
Ans.16. 7757 Å.

Q 17. Calculate the work function, if the longest wavelength which will produce photo electrons emission from a metal surface is 6000Å.
Ans.17. 2.068 eV.

Q 18. The kinetic energy of the fastest moving photo electron from a metal of work function 2.8 eV is 2eV. Calculate the value of kinetic energy if the frequency of the light is doubled.
Ans.18. 6.8 eV.

Q 19. Calculate the number of photons emitted by a 60 watt sodium lamp (λ = 5896Å)in 12 hours.
Ans.19. 7.69×10^{24}.

Q 20. Calculate the number of photons emitted per second by 25 watt source of monochromatic light of wavelength 6000Å.
Ans.20. 7.57×10^{19}.

Q 21. Calculate the velocity with which an electron must travel so that its momentum is equal to that of a photon with wavelength of 5200Å.
Ans.21. 1398.9 m/sec.

Q 22. A tungstun cathode has a threshold 2300 Å, if ultraviolet light of wavelength 1800 A falls upon it, then calculate (i) the maximum K. E. of the emitted electrons and (2) the work function of tungstun.
Ans.22. (i) 1.484 eV; (2) 5.37 eV.

Q 23. Ultra violet lights of wavelength 800Å and 700Å when allowed to fall on hydrogen atom in their ground state is found to liberate electrons with kinetic energy, 1.8 eV and 4eV respectively. Calculate the value of Planck's constant.
Ans.23. 6.57×10^{-34} joule sec.