

Terms and definitions

1. **Work Function (ϕ_0):** Minimum energy required for an electron to escape from a metal surface, measured in electron volts (eV).
2. **Photoelectric Effect:** Phenomenon where electrons are emitted from a material when it is exposed to light of sufficient frequency.
3. **Threshold Frequency (ν_0):** Minimum frequency of incident radiation required to cause photoelectric emission from a material.
4. **Photon:** A quantum of electromagnetic radiation, having energy proportional to its frequency.
5. **Stopping Potential (V_0):** Minimum negative potential required to stop the most energetic photoelectrons from reaching the anode.
6. **Electron Emission:** Release of electrons from a material's surface due to thermal, electrical, or light energy.
7. **Thermionic Emission:** Emission of electrons from a heated metal surface.
8. **Field Emission:** Emission of electrons from a metal surface due to the application of a strong electric field.
9. **Photoelectric Emission:** Emission of electrons when a material is illuminated by light of sufficient energy.
10. **Intensity of Light:** Measure of the power per unit area of the incident light on a surface.
11. **Einstein's Photoelectric Equation:** Mathematical relation explaining photoelectric emission, given by $K_{max} = h\nu - \phi_0$, where $h\nu$ is the energy of the incident photon.
12. **de Broglie Wavelength:** Wavelength associated with a particle of matter, given by $\lambda = h/p$, where h is Planck's constant and p is momentum.
13. **Planck's Constant (h):** Fundamental constant relating energy and frequency of radiation, approximately 6.63×10^{-34} Js.
14. **Matter Waves:** Waves associated with particles of matter, proposed by de Broglie.
15. **Photon Energy:** Energy of a photon given by $E = h\nu$, where ν is the frequency of the radiation.
16. **Saturation Current:** Maximum photocurrent observed when all photoelectrons are collected at the anode.

17. **Millikan Oil Drop Experiment:** Experiment performed to measure the charge of the electron.
18. **Wave-Particle Duality:** Concept that particles such as electrons and photons exhibit both wave-like and particle-like properties.
19. **Cathode Rays:** Streams of electrons observed in vacuum tubes, discovered by J.J. Thomson.
20. **Photoelectron:** Electron emitted from a material during the photoelectric effect.
21. **Davisson and Germer Experiment:** Experiment that confirmed the wave nature of electrons by observing electron diffraction.
22. **Energy Quantum:** Smallest possible discrete unit of energy, associated with photons.
23. **Compton Effect:** Phenomenon in which X-rays scattered by electrons exhibit a shift in wavelength, confirming the particle nature of photons.
24. **Quantum Mechanics:** Branch of physics that describes the behavior of particles at atomic and subatomic levels.
25. **Electromagnetic Wave:** Wave consisting of oscillating electric and magnetic fields, traveling at the speed of light.
26. **Specific Charge (e/m):** Ratio of the electric charge to the mass of a particle, used to characterize electrons.
27. **Potential Difference (V):** Electric potential difference between two points, measured in volts.
28. **Electric Field (E):** Field surrounding a charged particle, exerting force on other charged particles.
29. **Diffraction:** Bending of waves around obstacles or through slits, demonstrating wave nature.
30. **Quantum of Radiation:** Smallest packet of energy associated with electromagnetic radiation, synonymous with photon.

These terms capture key concepts related to the dual nature of electrons and radiation, as well as the foundational principles of quantum physics presented in the document.