JEE (2023)

Dual Nature of Radiation and Matter

DPP-02

- 1. The work functions for tungsten and sodium are 4.5 eV and 2.3 eV, respectively. If the threshold wavelength λ for sodium is 5460 Å, the value of λ for tungsten is
 - (1) 5893 Å (2) 10683 Å
 - (3) 2791 \AA (4) 528 \AA
- 2. The photoelectric threshold for some material is 200 nm. The material is irradiated with radiations of wavelength 40 nm. The maximum kinetic energy of the emitted photoelectrons is
 - (1) 2 eV (2) 1 eV
 - (3) 0.5 eV (4) none of these
- **3.** Monochromatic light incident on a metal surface emits electrons with kinetic energies from zero to 2.6 eV. What is the least energy of the incident photon if the tightly bound electron needs 4.2 eV to remove?
 - (1) 1.6 eV
 - (2) From 1.6 eV to 6.8 eV
 - (3) 4.2 eV
 - (4) More than 6.8 eV
- 4. Threshold frequency for a certain metal is v_0 . When light of frequency $2v_0$ is incident on it, the maximum velocity of photoelectrons is 4×10^8 cm s⁻¹. If frequency of incident radiation is increased to $5v_0$, then the maximum velocity of photoelectrons, in cm s⁻¹, will be

(1) $(4/5) \times 10^8$ (2) 2×10^8

- (3) 8×10^8 (4) 20×10^8
- 5. Light of wavelength 0.6 μm from a sodium lamp falls on a photocell and causes the emission of photoelectrons for which the stopping potential is 0.5 V. With light of wavelength 0.4 μm from a mercury vapor lamp, the stopping potential is 1.5 V. Then, the wok function [in electrons volts] of the photocell surface is

(1) 0.75 eV (2) 1.5 eV

(3) 3 eV (4) 2.5 eV

- 6. Stopping potential for photoelectrons
 - (1) Does not depend on the frequency of the incident light
 - (2) Does not depend upon the nature of the cathode material
 - (3) Depends on both the frequency of the incident light and nature of the cathode material
 - (4) Depends upon the intensity of the incident light
- 7. The stopping potential V for photo-electric emission from a metal surface is plotted along *Y*-axis and frequency v of incident light along *X*-axis. A straight line is obtained as shown. Planck's constant is given by



- (1) Slope of the line
- (2) Product of slope of the line and charge on the electron
- (3) Product of intercept along *Y*-axis and mass of the electron
- (4) Product of slope and mass of electron
- 8. In a photoelectric emission, electrons are ejected from metals X and Y by light of frequency f. The potential difference V required to stop the electrons is measured for various frequencies. If Y has a greater work function than X, which graph illustrates the expected results?



9. Figure shows the plot of the stopping potential versus the frequency of the light used in an experiment on photoelectric effect. The ratio h/e is:



- 10. The work function for tungsten and sodium are 4.5 eV and 2.3 eV respectively. If the threshold wavelength λ for sodium is 5460 Å, the value of λ for tungsten is
 - (1) 5893 Å
 - (2) 10683 Å
 - (3) 2791 Å
 - (4) 528 Å

Answer Key			
1. 2	(3)	6. (3) 7 (2)	
2. 3.	(4) (3)	$ \begin{array}{ccc} 7. & (2) \\ 8. & (1) \end{array} $	
4. 5.	(3) (2)	9. (4) 10. (3)	