PHYSICS

BOOKS - PUNJAB BOARD PREVIOUS YEAR PAPERS

Particle Nature of Radiation

Exercise

1. Two metals X and Y have work functions 2eV and 5eV respectively. Which metal will emit

electrons, when irradiated with light of wavelength 400m, and why?

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2. Calculate the work function of a metal in eV, if its thresold wavelength $6800\overset{\circ}{A}$ and $h = 6.62 \times 10^{-27}$ ergs.

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3. Visible light cannot eject photoelectrons from copper surface, whose work function is 4.4 eV. Why? Prove it mathematically.

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4. Find the energy of each of photon which correspond to light of frequency 3*(10)-15.

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5. Find the number of photon emitted per minute by 60 what lamp of monochromatic light of wavelength $5000\overset{\circ}{A}$

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6. A metal has thresold wavelength at $6400\overset{\circ}{A}$. Calculate thtesold frequency

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7. A metal has thresold wavelength at $6400\mathring{A}$. Calculate work function of metal in eV.

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8. Light of wavelength 500 nm falls on a metal whose work function is 1.9 eV. find the energy of the Photon in eV

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9. Light of wavelength 500 nm falls on a metal whose work function is 1.9 eV. find the kinetic energy of the photo electrons emitted.

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10. Calculate the frequency associated with a photon of energy 3.3×10^{-20} J $\left(h = 6.6 \times 10^{-34} Js\right)$.

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11. Calculate the photon energy in electron-volt for radiation of wavelength 1 metre.

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12. Calculate the momentum of a photon of green light its frequency $v = 6 \times 10^{14}$ Hertz (Hz) moving through the free space.

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13. A metal has work function 5eV. Will this metal emit electrons, when light of wavelength 400 nm falls on it?

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14. Work function of Na is 2.75 eV. DOes sodium show photoelectric emission for light of wavelength $6800\overset{\circ}{A}$? (given h $= 6.62 \times 10^{-34}$JS)

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15. The work function of a certain metal is 4.2 eV. Will this metal give photoelectric emission for incident radiation of wavelength 330 nm?

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16. A metal has a thresold wavelength of $6000\mathring{A}$

Calculte:Thresold frequency

Calculate Work function of metal (given: $h = 6.62 \times 10^{-34} Js, e = 1.6 \times 10^{-19} C$)

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17. The thresold frequency for a certain metal is $3.3 \times 10^{14} Hz(Hertz). If the light of frequency$ 8.2 xx 10^(14)` Hz (Hertz) is incident on the metal, find the cut off voltage for photoelectric emission.

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18. Calculate the wavelength of a photon of energy 10^{10} eV (electron volt(. Given Planck.s constant $h = 6.625 \times 10^{-34} Js$ (Joule Second).

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19. Calculate the momentum of photon. Frequency associated with the photon is $5x10^{913})$ Hz

Given $h = 6.6x10^{-34} JS, c = 3x10^{8} ms^{-1}$.

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20. Work function of a photosensitive metal is 1.875 eV. Calculate the wavelength of incident light, which will just cause the emission of photoelectrons.

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21. Calculate the threshold wavelength of photons, which can emit photoelectrons from

cesium. Given that work function of cesium=1.8 eV.

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22. The work function of sodium is 2.3 eV. Calculate the maximum wavelength for the light that will cause photoelectrons to be emitted from sodium.

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23. light of wavelength $2200\overset{\circ}{A}$ (angstorm) falls on photosensitive plate with work function 4.1 eV. Find energy of photon in eV (electron Volt) Find maximum kinetic energy of photoelectron and stopping potetial.

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24. light of wavelength $2200\overset{\circ}{A}$ (angstorm) falls on photosensitive plate with work function 4.1 eV. Find energy of photon in eV (electron Volt)

Find maximum kinetic energy of photoelectron and stopping potetial.

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25. Light of wavelength $5000\mathring{A}$ falls on a photosensitive plate with work function 1.9 eV. Find energy of photon in eV(electron Volt)

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26. Light of wavelength $5000\mathring{A}$ falls on a photosensitive plate with work function 1.9 eV. FInd maximum kinetic energy of photoelectron and stopping potential.

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27. A 100 W (Watt) sodium Lamp radiated energy uniformly in all directions. The lamp is located at the centre of a large sphere, that absorbs all the sodium light which is incident

on it. The wavelength of the sodium light is 589 nm(nano metre): At what rate are the photons delivered to the sphere?

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28. A 100 W (Watt) sodium Lamp radiated energy uniformly in all directions. The lamp is located at the centre of a large sphere, that absorbs all the sodium light which is incident on it. The wavelength of the sodium light is

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29. Light of frequency $7.21x10^{14}Hz$ (Hertz) is incident on a metal surface. Electrons with a maximum speed if $6.0 \times 10^{5}ms^{-1}$ (metre per second) are ejected from the surface. What is the threshold frequency fro photo emission of electrons?

Given $\rightarrow$ h(Planck constant) =

$6.63 \times 10^{-34} Js$(Joule Second)

m_e (mass of electron)=9.1×10^{-31} kg (kilogram)

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30. Define threshold wave length.

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31. Can X -rays show photo electric effect with visible light, if yes why?

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32. Which photon is more energetic: A red one or violet one?

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33. Define work function.

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34. Define stopping potential.

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35. Why the alkali metals are most suitable for studying the photoelectric emission?

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36. Define thresold frequency for photoelectric emiision.

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37. Define stopping potential.

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38. Write Einsteins's photoelectric equation.

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39. Write down the relation between energy and momentum of photon.

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40. Define the photoelectric work function of a metal..

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41. Which photon is more energetic, green or blue?

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42. Define stopping potential.

Watch Video Solution

43. Define thresold frequency for photoelectric emiision.

Watch Video Solution

44. Which photon is more energetic: A red one or violet one?

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45. Define the photoelectric work function of a metal..

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46. Define stopping potential.

Watch Video Solution

47. Define the term threshold frequency.

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48. Define thresold wavelength for phtoelectric effect.

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49. Define work function.

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50. What are photo-electrons?

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51. On what factors does the threshold frequency depend?

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52. What must be the main feature of a metal used for photoelectric emission?

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53. Define thresold wavelength for phtoelectric effect.

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54. What is photon?

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55. Define stopping potential.

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56. Select the correct option: The mass of photon at rest is

A. 1 amu

B. 0

C. $1.6 \times 10^{-27} kg$

D. $9.1 \times 10^{-31} kg$

Answer:

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57. Select the correct option:

A. With increase in intensity of incident light, photoelectric current decreases.

B. With increase in intensity of incident light, photoelectric current increases.

C. With increase in intensity of incident light, kinetic energy of emitted electrons increases.

D. WIth increase in intensity of incident light, kinetic energy of emitted electrons increases.

Answer: WIth increase in intensity of incident light, kinetic energy of emitted electrons decreases.

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58. If the intensity of incident radiataions on a metal is doubled, what happens to the K.E. of electrons emitted.

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59. Charge on photon is equal to:

A. Charge on electron

B. Charge on proton

C. Charge on alpha particel

D. Zero

Answer:

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60. Write de-Brogile hypothesis for matter wave and find an expression for de- Brogile wavelength.

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61. Write Einsteins's photoelectric equation.

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62. What is the rest mass of a photon?

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63. What is photoelectric effect?

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64. What is photoelectric cell? Explain any one of the photoelectric cell.

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65. What is photo electric cell? Gives its two applications.

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66. What is photo electric cell? Gives its two applications.

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67. It is easier to remove an electron from sodium than from copper, why? Which metal has higher value of threshold frequency?

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68. Blue light can eject electrons from a photo sensitive surface while orange light can not. Will violet and red light eject electrons from the metal surface?

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69. Derive the relation for Einstein.s photoelectric equation in terms of frequency.

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70. State the laws of photoelectric emission on the basis of Einstein's photoelectric equation.

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71. State Four laws of photoelectric emission.

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72. Define stopping potential and threshold frequency in relation to photoelectric effect.

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73. What is photo electric cell? Gives its two applications.

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74. What are photons? Give its two properties.

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75. Why the alkali metals are most suitable for studying the photoelectric emission?

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76. Green light ejects electrons from a certain photosensitive surface, yellow light does not. Will red and violet light eject electrons from the same surface? Give reasons.

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77. Define stopping potential and threshold frequency in relation to photoelectric effect.

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78. Why the alkali metals are most suitable for studying the photoelectric emission?

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79. Exaplain the laws of photoelectric emission on the basis of Einstein.s photoelectric equation.

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80. Define the photoelectric work function of a metal..

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81. What are photons? Give its two properties.

Watch Video Solution

82. State Four laws of photoelectric emission.

Watch Video Solution

83. What is the effect of decrease in wavelength of incident light on the velocity of photoelectrons?

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84. State Four laws of photoelectric emission.

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85. Exaplain the laws of photoelectric emission on the basis of Einstein.s photoelectric equation.

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86. Discuss graphical variation photoelectric current with potential difference in photoelectric cell and explain what information do you get from this graph?

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87. State the laws of photoelectric emission on the basis of Einstein's photoelectric equation.

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