PHYSICS

BOOKS - BETTER CHOICE PUBLICATION

PARTICLE NATURE OF RADIATION

Very Short Answer Questions

1. Define the term threshold frequency and stopping potential in relation to phenomenon of photoelectric effect. How is the

photoelectric current affected on increasing the

frequency?

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2. Define thresold frequency for photoelectric emiision.

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3. You are given. red and yellow photon of light, which will carry more energy ?

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4. What determines the maximum velocity of the photoelectrons?

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

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6. Does the thresold frequency depend on intensity of light?

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7. On what factor the retarding potential of photocell depends?

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8. It is harder to remove a free eletron from copper than from sodium .Which metal has greater work function?Which has higher threshold waelength?

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9. Does the stopping potential in photoelectric emissiondepend upon

the frequency of the incident radiation?

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10. Define work function of metal and photoelectric effect.

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11. Define work function of metal and photoelectric effect.

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12. What is the effect on the velocity of the photo-electrons,if the wavelength of the incident light is decreased?

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13. What are photoelectrons?

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14. Name a physical quantity ,whose dimensions are same as those of Planck's constant.

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15. Do non-metals show photoelectric effect?

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16. Define thresold wavelength for phtoelectric effect.

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17. How will the stopping potential chnge,if the frequency of the radiation incident on a metal surface is increased?

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

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19. If intenstiy of radiation incident on a photosensetative plate is doubled,how does the stoping potential change?

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

21. What must be the main feature of a metal use for photoelectric emission?

22. Why are alkali metals most suited as photosensitive materials?

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23. Write Einsteins's photoelectric equation.

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24. Write down the relation betwen the energy and the momentum of a photon.

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

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26. What must be the main feature of a metal use for photoelectric emission?

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27. Which phenomenon illustrats the particle nature of light?

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Very Short Answer Questions Most Expected Questions

1. What is photon?

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2. State any two properties of the compound.

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3. Discuss the motion of a charged particle when subjected to a uniform magnetic field when The direction of motion of charged particle is perpendicular to the magnetic field?

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4. On which factor does the energy carried by a quantum of light depend?

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5. Electron and proton are moving with the same speed, which will have more wvalength?

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6. The wavelength of electromagnetic wave is doubled. What will happen to the energy of photons ?

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Short Answer Type Questions

1. Why the photoelectric cell is also called an elecric eye?

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2. Why are alkali metals most suited as photosensitive materials?

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3. Explain 'stopping potential' and 'threshold frequency' in photoelectric emission.Give an appropriate graph.

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4. Are matter waves electromagnetic?

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5. What is the rest mass of a photon?

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6. What is photo electric cells? Give its two applications.

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7. It is harder to remove free electrons from copper than from sodium. Which has higher work function.

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8. Blue light can eject electrons from a Photo-sensitive surface, while orange cannot. Will violet and red light eject electrons from the same surface?

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9. Derive Einstein's' photoelectric equation in terms of frequency.

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10. State the four laws of photoelectric emission.

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11. What are Photons? Give its two properties.

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

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13. Write Einsteins's photoelectric equation.

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14. What is phtotelecric effect?Explain the effect of increase of intensity of incident radiation on photoelectric current.

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15. Define photoeletjric effect ,work function,stopping potential and threshold frequency.a

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16. What are Photons? Give its two properties.

Watch Video Solution

17. Derive Einstein's' photoelectric equation in terms of frequency.

Watch Video Solution

18. What is photoelectric effect? State it laws?

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19. What is photoelectric cell? Explain any one of the photoelectric cells.

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20. What is photoelectric cell?How dies it work ?Give its practical uses.

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21. What is photoelectric effect?

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22. Write Einsteins's photoelectric equation.

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23. State the four laws of photoelectric emission.

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24. What is photoelectric effect?

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25. Discuss suitable experiment to study the laws of photoelectric emission.

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Short Answer Type Questions Most Expected Questions

1. Photoelectric emission is an instantaneous process.Comment.

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2. Every mrtal has a definite work function. Why do all photoelectrons not come out with same energy, if incident radiation is monochromatic? Why is there an energy distribution of photoelectrons?

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3. Which of the following has the largest de Broglie wavelength (all have eual velocity)?

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Numerical Problems

1. Light of wavelength $5,500\overset{\circ}{A}$ falls on a sensitive plate with work function 1.7 eV .Find energy of photon ,

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2. When light of wavelength 400 nm is incident on the cathode of photocell,the stopping potential recorded is 6 V.If the wavelength of the incident light is increased to 600 nm , calcuulate the new stopping potential.

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3. The energy of photoelectrons emtted from a photo-snsitive plate is 1.56 eV if threshold

waveelngth is $2,500 \circ A$,calculate the waveelngth of incident light.Given ,1ev $= 1.6 \times 10^{-12} erg$ and $h = 6.62 \times 10^{-27}$ erg s.

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

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

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7. Calculate the frequency associated with a photohn of energy $3.3 \times 10^{-20} J$.Give n, $h = 6.6 \times 10^{-34} Js$.

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8. Ligth of waveelength $2,200 \overset{\circ}{A}$ falls on a metal with work function 4.1 eV.Find teh maximum kinetic energy of th emitted elecrtrons and the stopping potential.Gien that

$h = 6.62 \times 10^{-34} Js, c = 3 \times x10^{8} ms^{9} - 1)$

and $e = 1.6 \times 10^{-19} C$.

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9. Find the frequency of light which ejects electrons from a metal surface, fully stopped by a retarding potential of 3 V. The photoelectric effect brings in this metal at a frequency of $6 \times 10^{14} Hz$. Find the work function for this metal $(Givenh = 6.63 \times 10^{-34} Js)/$

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10. A radiation of $5000\overset{\circ}{A}$ is incident on metal surface whose work- function is 1.2 eV. find out the value of stopping potential.

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11. Light of wavelength $5,500\overset{\circ}{A}$ falls on a sensitive plate with work function 1.7 eV .Find stopping potential.

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12. Light of wavelength $5,500\overset{\circ}{A}$ falls on a sensitive plate with work function 1.7 eV .Find stopping potential.

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13. Light of wavelength $5,500\overset{\circ}{A}$ falls on a sensitive plate with work function 1.7 eV .Find stopping potential.

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14. Two metals X and Y have work functions 2eV and 5eV respectively. Which metal will emit electrons when it is irradiated with light of wavelenth 400 nm and why?

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15. Calculate the work function of a metal in eV,if its threshold waveelngth is $6,800^{A}$ and $h = 6.62 \times 10^{-27} ergs.$

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16. Visible light cannot eject photo electrons from copper metal, whose work function is 4.4 e V. Why? Prove it mathematically.

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17. Find

the number of photons wmitted er minute by 60 W lamp of moochromatic light of wavelength $5,000\overset{\circ}{A}$.

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18. A emtal has threshold waveelngth of $6,000\overset{\circ}{A}$.Calculate

threshold frequecy

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19. Light of wavelength $5,500\overset{\circ}{A}$ falls on a sensitive plate with work function 1.7 eV .Find energy of photon ,

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20. 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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21. Find the photon energy in eV for electromagnetic wave of wavelength (λ) 1 m. Given that $h = 6.63 \times 10^{-34} Js, e = 1.6 \times 10^{-19} C.$

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22. Calculate the energy of a photon of light having frequency of 6 x 10^15 s-1

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23. A metal has work function 6 eV. Will this metal emit electrons, when light of wavelength 400 nm falls on it ?

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24. Work function of Na is 2.75 eV. Does sodium show photelectric emission for light of wavelength $6,800\mathring{A}$?

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

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26. A metal has a threshold wavelength of 6000 Å. Calculate : Threshold frequency given :

$h = 6.62 \times 10^{-34} Js, e = 1.6 \times 10^{-19} C.$

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27. The threshold frequency for a certain metal is $3.3 \times 10^{14} Hz.$ If light of frequency $8.2 \times 10^{14} Hz$ is incident on the metal, predict

the cut-off voltage for the photoelectric emission.

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28. Calculate the wavelength of a photon of energy $10^{10}eV$ (electron volt). Given Planck's constant $h = 6.62 \times 10^{-34}Js$, (Joule second)

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29. Calculate momentum of photon. Frequency associated with the photon is 5×10^{13} Hz. Given $h6.6 \times 10^{-34}$ Js and $c = 3 \times 10^{8} ms^{-1}$

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30. Light of wavelength 2200 Å (angstorm) falls on photosensitive plate with work function 4.1 eV. Find energy of photon in eV

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31. Light of wavelength $5,500\mathring{A}$ falls on a sensitive plate with work function 1.7 eV .Find energy of photon ,

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32. Light of wavelength 2200 Å (angstorm) falls on photosensitive plate with work function 4.1 eV. Find energy of photon in eV

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