PHYSICS

BOOKS - R G PUBLICATION

DUAL NATURE OF RADIATION AND MATTER

Exercise

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1. Find the dimestion of Planck's constant.

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2. Find the dimestion of Planck's constant.

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3. What is the dimestion of work function?

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4. Give the dimestion of Planck's Constant

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5. Write down Einstein's photo electric equation and explain each of its terms.

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6. What is photoelectric effect? Why is photo electric current proportional to the intesity of incident radiation?

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7. Write down Einstein's photo electric equation and explain each of its terms.

8. Work function of Caesium is 2.14 eV.

Find its threshold frequency.

$$h = 6.63 \times 10^{-34} Js, 1eV = 1.6 \times 10^{-19} J$$

9. Find the wavelength of an electron acelerated through a potential difference of 1 volt.

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10. What is radiation pressure.

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11. A monochromatic source of light operating 200W emits 4×10^{20} photons/sec. Find the wavelength of the light. Given $h = 6.63 \times 10^{-34} J - S, C = 3 \times 10^8 m/s.$

12. What is the de-Broglie wavelength of an electron in the Bohr's orbit of radius $0.51\overset{\circ}{A}$ in hydrogen atom?

13. Derive an expression for the radius of the first orbit of the electron of the hydrogen atom.

14. Obtain the binding energies of the nuclei $_{26}^{56}Fe$ and $_{83}^{209}Bi$ in units of MeV from the given data.

$$m_H = 1.007824 a\mu$$

$$m_n = 1.008665 a\mu$$

$$m\left(\ _{26}^{56}Fe\right) = 55.934939a\mu$$

$$m\left(\ _{83}^{209}Bi\right) = 208.980388a\mu$$

1 amu= 931.5 Mev

Which nucleus has greater binding energy per nucleo?

15. A photo electric surface has work function 2eV. What is the maximum kinetic energy of the emitted photoelectrons ejected by light by wavelength $3000\overset{\circ}{A}$

Given

$$h = 6.6 \times 10^{-34} J - S, e = 1.6 \times 10^{-19} C.$$

$$m_e = 9g0^{-31} kg, C = 3 \times 10^8 m/\sec$$

16. There are mainly three ways to eject an electron from the surface of metals. What are those?

17. If kinetic energy of a free electron is increased by two times then by how many times will the De-Broglie wavelenght be changed?

18. What is the de Broglie wavelength associated with an electron of mas $9.11 \times 10^{-31} kg$ moving with a speed $5.4 \times 10^6 m/s$. Given `h=6.63x10^(-34)Js.

19. What is the de Broglie wavelength associated with

a ball of mass 150g travelling at $30m/s$? Given $h = 6.63 \times 10^{-34} Js$.

20. What determines the intensity of light in the photon picture of light?

21. Fill in the blanks

X rays is discovered by ____ in ____.

22. Fill in the blanks

Einstein was awarded the Nobel Prize in __ for his contribution to __ and ___

23. Fill in the blanks

Photons are electrically neutral and not deflected by ____and ___ fields.

24. Fill in the blanks

In ____De Broglie was awarded the Nobel Prize in Physics for his discovery of ____.

25. Write down Einstein's photo electric equation and explain each of its terms.

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26. What is cut-off or stopping potential?

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27. What is de Broglie wave length? Give the de Broglie equation.

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28. What is the charge on cathode ray particle?

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29. Express Joule in eV.

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30. Which oil should be used in Milikan's method.

31. An electron is accelerated through a potential differencve 1000V. What is its kinetic energy in MeV.

32. The ratio of specific charges of an electron to that of a hydrogen ion is ?

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33. Can we use water drop in milkan oil drop method, why?

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34. Write any 3 properties of cathode rays?

35. An electron of charge 'e' at rest in accelerted in a uniform electric field E. It covers a distance x. What is the kinetic energy gained by the electron?

36. What is specific charge? State its S.I. unit.

37. Define work function of a metal.

38. What is thresold frequency?

39. What is rest mass of photon?

40. In a photo electric effect kinetic energy of photo electron depend upon which factor?

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41. What is dark current?

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42. Is there any difference between light wave and matter wave?

43. Define work function of a metal.

44. Write a short note on Hertz's observation photo electric effect.

45. Draw the variation cureve of photo current with collector plate potential for differentfrequencies but same intensityof incident radiation.

46. What is thresold frequency?

47. Write a short noite on particle nature of light.

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48. Calculate the de Broglie wave length of a ball of mass $0.16 kg$ moving with a speed of $18\frac{m}{s}$.

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49. Write the Huygenberg's uncertainty principle.

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50. Find out the maximum frequency and minimum wavelength of X ray produced by 30 KV electrons.

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51. What is a photon? Write its properties.

52. State laws of photoelectric emission. Establish Einesteins photoelectric relation.

53. How much charges is carried by 1 kg of photo electron.

54. State laws of photoelectric emission. Establish Einesteins photoelectric relation.

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55. The working function for a certain metal is 4.2ev. Will these metal give photoelectric emision for incident radiation of wave length 330 nm.

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56. What is the imporant proof of de-Broglie wave.

57. Prove that $= \dfrac{h}{\sqrt{2mE}}$.

58. Explain one physical process for release of electron from surface of a metal.

59. A cathod ray is operated 2500 V. What is the speed of elelctron?

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60. How is the mass of an electron determined?

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61. An electron of energy 150 eV describes circle in a energetic field of .IT. Calculate radius of cirlce.

62. Draw the variation cureve of photo current with collector plate potential for differentfrequencies but same intensityof incident radiation.

63. The minimum energy required for the electron emission from the metal surface can be supplied to the free electrons by one of some physical processes. What are they.

64. Give the experimental study of photo electric effect. Draw the variation curve photo electric current with intensity of light.

65. Establish Einestein's photoelectric equation.

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66. What is wave nature of matter? What is the hypothesis forwarded by Louis Victor de Broglie in 1924?

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67. A ball of mass 0.12 kg is moving with a speed 20 m/s. Calculate the de Broglie wavelength. (Planck constant h=6.62×10 −34 J.s)

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68. Describe Milikan's oil drop experiment to determine the charge of an electron.

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69. What are Cathod rays? How they are produced .

70. Discuss J.J. Thomoson's method for the determination of specific chage of electron.

71. Give the experimental study of photo electric effect. Draw the variation curve photo electric current with intensity of light.

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72. What is photoelectric effect? Why is photo electric current proportional to the intesity of incident radiation?

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73. State laws of photoelectric emission. Establish Einesteins photoelectric relation.

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74. Describe photoelectric cell and mention some of its important applications.

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75. Explain why wave theory can't explain photoelectric effect.

76. Describe Davisson and Germer experiment to establish the wave nature of electron. Draw labelled diagram of the apparatus used.

77. Calculate the number of photon emitte per second by a 10 watt Na lamp. Assume 90% of consumed energy converted into light. Wave length of Na lamp 530 nm.

78. Calculate the number of photons emitted per second by a 10 W sodium vapour lamp. Assume that 60% of the consumed energy is

converted into light. Wavelength of sodium light = 590 nm.

79. Calculate the

de-Broglie wave length of the electrons

accelerated through a potential difference

56V.