PHYSICS

BOOKS - BETTER CHOICE PUBLICATION

WAVE NATURE OF MATER

Very Short Answer Type Questions

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

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2. With what purpose was famous Davisson Germer experiment with electrons performed?

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3. The mass of an electron is m, charge is e and it is accelerated form rest through a potential difference of V volts. The velocity acquired by electron will be :

A. $\frac{eV}{2m}$

B. $\frac{eV}{m}$

C. $\sqrt{\frac{2eV}{m}}$

D. $\sqrt{\frac{eV}{m}}$

Answer: C

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4. The minimum wavelength of the X-rays produced by elecrons accelerated through a otential of V (in volt) is directly poroportionla to

A. $\sqrt{V}$

B. V^2

C. $\frac{1}{\sqrt{V}}$

D. $\frac{1}{V}$

Answer: D

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5. The de-Broglie wave corresponding to a particle of mass m and velocity v has a wavbeelngth associated with it

A. h/mv

B. hmv

C. $\frac{mh}{v}$

D. $\frac{h}{\sqrt{v}m}$

Answer: A

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Very Short Answer Type Questions Most Expected Questions

1. Why are de-Broglie waves with a moving football not visible?

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2. A photon and an electron have got same de Brogile wavelength. Which has greater total energy? Explain.

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Short Answer Type Questions

1. Write de Brogile hypothesis for matter wave and find an expression for de-Broglie wave length.

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

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

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4. An electron and alpha particle have the same de-Broglie wavelength associated with them. How are their kinetic energies related to each other?

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5. Calculate the de-Brogile wavelength of an electron.

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6. Why are de-Broglie waves with a moving football not visible?

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7. Why is wave nature of matter not apparent to our daily observations?

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8. Write de Brogile hypothesis for matter wave and find an expression for de-Broglie wave length.

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Numerical Problems

1. If a photon and an electron have the same de-Broglie wavelength of 0.5Å, then find the ratio of kinetic energy of photon to that of electron (Mass of electron $= 9.1 \times 10^{-31} kg$)

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2. A photon and an electron have the same wavelength.Then,the velocity of photon is

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3. The de-Broglie wavelength λ of a particle is related to ites kinetic energy E as:

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4. If h is the Planck's constant, find the momentum of the photon of wavelength 0.1Å

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5. Find the de-Broglie wavelength of wave associated with a particle of rest mass $9 \times 10^{-31} kg$ and moving with a speed of $1.5 \times 10^{8} ms^{-1}$. $\left(h = 6.6 \times 10^{-34} Js\right)$.

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6. Find de Broglie wavelength of wave associated with a particle of rest mass $5 \times 10^{-30} kg$ and moving with a speed $1.8 \times 10^{8} ms^{-1} \left(h = 6.6 \times 10^{-34} Js\right)$.

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7. Find de-Broglie wavelength of wave associated with a particle of rest mass $4 \times 10^{-29} kg$ and moving with a speed $2.4 \times 10^{-8} ms^{-1}$. (h= 6.6 xx 10^(-34) Js)`

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8. Find de Broglie wavelength of wave associated with a particle of rest mass

$5 \times 10^{-30} kg$ and moving with a speed $1.8 \times 10^{8} ms^{-1} \left(h = 6.6 \times 10^{-34} Js\right)$.

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9. Calculate momentum of electron, if their wavelength is $2\overset{\circ}{A}$. Given, Planck's constant $h = 6.625 \times 10^{-34} Js$, mass of electron $m = 9.1 \times 10^{-31}$kg.

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10. Calculate the de-Broglie wavelength for electron moving with speed of $6 \times 10^5 ms^{-1}$.

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11. What voltage must be applied to an elecron microscope to produce electrons of wavelength $0.4\overset{\circ}{A}$?

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12. A photon and an electron have got same de Brogile wavelength. Which has greater total energy? Explain.

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13. What is the de-Broglie wavelength of an electron with kinetic energy of 120 eV?

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14. Calculate the momentum and de-Broglie wavelength of the electrons accelerated through a potential difference of 56V.

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15. Calculate momentum of electron, if their wavelength is $1\overset{\circ}{A}$. Given, Planck's constant $h = 6.625 \times 10^{-34} Js$, mass of electron $m = 9.1 \times 10^{-31}$kg.

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16. Calculate the momentum of electrons, if their wavelength is 3Å. Given that Planck's constant, $h = 6.626 \times 10^{-34} Js$, mass of electron, $m = 9.1 \times 10^{-31} kg$.

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17. Calculate the de-Bronglie waveelngth for electron and protonif their speed is $10^5 ms^{-1}$

.Given,mass of an electron $= 9.1 \times 10^{-31} kg$,mass of proton = $1.67 \times 10^{-27} kg$ and Planck's constant = $6.62 \times 10^{-34} Js$.

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18. Calculate the de-Broglie wavelength for electron moving with speed of $6 \times 10^5 ms^{-1}$.

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19. Calculate the de-Broglie wavelength of an electron moving with a speed of $9 \times 10^5 m/s$. Given $h = 6.6 \times 10^{-34} Js$ and mass of electron $= 9.1 \times 10^{-31} kg$.

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20. Calculate momentum of electron, if their wavelength is $2\overset{\circ}{A}$. Given, Planck's constant $h = 6.625 \times 10^{-34} Js$, mass of electron $m = 9.1 \times 10^{-31}$kg.

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21. What is the de-Broglie wavelength of an electron beam accelerated through a potential difference of 25 V?

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