A Level · OCR · Physics

4 mins 4 questions

Multiple Choice Questions

Photons & Wave-Particle Duality

The Photon / The Electronvolt / Determining the Planck Constant / Electron Diffraction / The de Broglie Equation

Easy (1 question)	/1
Medium (3 questions)	/3
Total Marks	**/4**

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Easy Questions

1 What can be deduced from the diffraction of electrons by a thin film of graphite?

A. Electrons are leptons.

B. Electrons are negatively charged.

C. Electrons interact with atoms on a one-to-one basis.

D. Electrons travel as waves.

(1 mark)

Medium Questions

1 An electron has a de Broglie wavelength equal to the wavelength of X-rays.

What is the **best** estimate of the momentum of this electron?

A. 10^{-30} kg ms^{-1}

B. 10^{-27} kg ms^{-1}

C. 10^{-23} kg ms^{-1}

D. 10^{-18} kg ms^{-1}

(1 mark)

2 In an experiment the de Broglie wavelength of an electron after being accelerated through a potential difference (p.d) V is λ_1.

The accelerating p.d is now tripled.

What is the new de Broglie wavelength of the electron in terms of λ_1?

A. $\frac{\lambda_1}{3}$

B. $\frac{\lambda_1}{\sqrt{3}}$

C. $\sqrt{3}\lambda_1$

D. $3\lambda_1$

(1 mark)

3 A neutron has a kinetic energy of 9.00 x 10^{-18} J.

Which is the correct expression for the de Broglie wavelength λ of the neutron?

A. $\lambda = \frac{6.63 \times 10^{-34}}{2 \times 1.675 \times 10^{-27} \times 9.00 \times 10^{-18}}$

B. $\lambda = \dfrac{6.63 \times 10^{-34}}{2 \times 9.11 \times 10^{-31} \times 9.00 \times 10^{-18}}$

C. $\lambda = \dfrac{6.63 \times 10^{-34}}{\sqrt{2 \times 1.675 \times 10^{-27} \times 9.00 \times 10^{-18}}}$

D. $\lambda = \dfrac{6.63 \times 10^{-34}}{\sqrt{2 \times 9.11 \times 10^{-31} \times 9.00 \times 10^{-18}}}$

(1 mark)