

44 Lecture - PHY101

Important Mcqs

What is the de Broglie wavelength of an electron with a velocity of 1.5×10^6 m/s?

- a. 0.253 nm
- b. 2.53 nm
- c. 25.3 nm
- d. 253 nm

Answer: a. 0.253 nm

Which of the following phenomena demonstrates the wave-like behavior of matter?

- a. Photoelectric effect
- b. Compton scattering
- c. Diffraction
- d. None of the above

Answer: c. Diffraction

Which equation is used to calculate the de Broglie wavelength of a particle?

- a. $\lambda = h/mv$
- b. $\lambda = h/mc$
- c. $\lambda = h?$
- d. $\lambda = hc/?$

Answer: a. $\lambda = h/mv$

Which of the following particles has the smallest de Broglie wavelength?

- a. A proton with a velocity of 10^6 m/s
- b. An electron with a velocity of 10^7 m/s

- c. A neutron with a velocity of 10^5 m/s
- d. All particles have the same de Broglie wavelength.

Answer: b. An electron with a velocity of 10^7 m/s

In which experiment did electrons exhibit interference patterns like those of waves?

- a. The photoelectric effect
- b. The Compton effect
- c. The double-slit experiment
- d. The Stern-Gerlach experiment

Answer: c. The double-slit experiment

Which of the following is an example of a particle that exhibits wave-like behavior?

- a. A proton
- b. A photon
- c. An electron
- d. All of the above

Answer: d. All of the above

The momentum of a particle is related to its de Broglie wavelength by which equation?

- a. $p = h/\lambda$
- b. $\lambda = h/p$
- c. $p = mc$
- d. $\lambda = c/p$

Answer: b. $\lambda = h/p$

Which of the following is NOT an example of wave-particle duality?

- a. Electrons behaving like waves in a double-slit experiment
- b. Photons behaving like particles in the photoelectric effect
- c. Atoms behaving like waves in a diffraction experiment

d. None of the above

Answer: d. None of the above

The uncertainty principle relates the uncertainty in a particle's position to the uncertainty in its:

a. Momentum

b. Energy

c. Velocity

d. All of the above

Answer: a. Momentum

Which of the following is a consequence of wave-particle duality?

a. The Heisenberg uncertainty principle

b. The Bohr model of the atom

c. The law of conservation of energy

d. None of the above

Answer: a. The Heisenberg uncertainty principle