Quantum Physics: Wave-Particle Duality

This is a preview of the draft version of the quiz

Started: Nov 4 at 11:04am

Quiz Instructions

Question 1 — 1 pts

What is the significance of the de Broglie wavelength?

- it was a theory that showed the speed of particles in a vacuum
- it was a theory that stated particles have wave properties
- it was a theory that explained collisions between electrons and photons
- it was a theory that predicted standing waves in the Bohr model

Question 2 — 1 pts

What is the signficance of the Davisson-Germer experiment?

- it provided evidence for the structure of an atom

- it provided evidence for the emission spectrum of hydrogen
- it provided evidence for the de Broglie wavelength
- it provided evidence for the Bohr model of an atom

Question 3

1 pts

A very small particle has a mass m and a velocity v. It is found to have a wavelength λ. If a second particle has a mass of m/2 and a velocity of 2v, what is the wavelength of the second particle?

- λ/2
- λ/16
- λ
- λ/4

Question 4

1 pts

Which of the following behaviors is best explained by the wave model of light?

- pair production
- Compton scattering

- diffraction
- the photoelectric effect

Question 5

1 pts

An electron is traveling with a speed of 1.75×10^7 m/s. What is the effective wavelength of the electron?

- 9.11 x 10-11 m
- 8.32 x 10-11 m
- 4.16 x 10^-11 m
- 9.87 x 10-11 m

Question 6

1 pts

A slow moving proton has its momentum doubled. How does this affect its deBroglie wavelength?

- it is doubled
- it is quadrupled
- it is divided by 2
- it is divided by 4

Question 7

1 pts

The work function of copper is 4.7 eV. What is the threshold frequency for copper?

- 2.11 x 10^14 Hz
- 3.26 x 10^15 Hz
- 1.14 x 10^15 Hz
- 3.81 x 10^14 Hz

Question 8

1 pts

Protons can be accelerated to nearly the speed of light in a particle accelerator. Find the deBroglie wavelength of a proton moving with a speed of 2.90×10^8 m/s.

- 2.35 x 10^-15 m
- 2.87 x 10^-15 m
- 3.32 x 10^-15 m
- 1.37 x 10^-15 m

Question 9

1 pts

For a hypothetical piece of metal, it takes an amount of energy E to remove an electron from the surface of the metal. What is the maximum wavelength of light that can photo eject an electron from this metal?

- (hc)/E
- f
- hf
- hc
- hcE

Question 10

1 pts

The work functions for each metal are listed below. If light with a frequency of 5.56×10^{15} Hz strikes each surface, which will emit an electron with the most energy?

- Platinum (Φ = 6.35 eV)
- Copper (Φ = 4.7 eV)
- Gold (Φ = 5.1 eV)
- Lead (Φ = 4.14 eV)

Question 11

1 pts

What is the momentum of a microwave photon that has a wavelength of 4.1 cm?

- 5.51∗10^−32 kg*m/s
- 2.12∗10^−32 kg*m/s
- 5.17∗10^−32 kg*m/s
- 1.62∗10^−32 kg*m/s

Question 12

1 pts

At what velocity will an electron have a wavelength of 1.2 m?

- 7.12 x 10^-4 m/s
- 6.06 x 10^-4 m/s
- 5.39 x 10^-4 m/s
- 6.78 x 10^-4 m/s

Not saved Submit Quiz