

Practice Quiz 4 Part 1

These are Q's from old quizzes. I do not guarantee that the Q's on this year's quiz will be the same, or even similar.

1. An electron and a proton both moving at nonrelativistic speeds have the same de Broglie wavelength. Which of the following are also the same for the two particles?

C

- a. The speed is the same for both particles.
- b. The kinetic energy is the same for both particles.
- c. The momentum is the same for both particles.
- d. The frequency is the same for both particles.
- e. All of the above statements are correct.

2. A rock of mass 0.100 kg is thrown with a speed of 50.0 m/s. What is its de Broglie wavelength?

D

- a. 5.30×10^{-34} m.
- b. 6.63×10^{-34} m.
- c. 1.27×10^{-28} m.
- d. 1.33×10^{-34} m.
- e. 1.66×10^{-31} m.

3. Electromagnetic radiation with a wavelength of 5.70×10^{-12} m is incident on stationary electrons. Radiation that has a wavelength of 6.57×10^{-12} m is detected at a scattering angle of:

D

- a. 0° .
- b. 120° .
- c. 40° .
- d. 50° .
- e. 60° .

4. In the photoelectric effect experiment the stopping potential, ΔV_s , is:

E

- a. the energy required to remove an electron from the sample.
- b. the kinetic energy of the most energetic electron ejected.
- c. the potential energy of the most energetic electron ejected.
- d. the photon energy.
- e. the electric potential that causes the electric current to vanish.

5. A sodium surface is illuminated with light of wavelength 300 nm. The work function for sodium metal is 2.46 eV. Find the maximum kinetic energy of the ejected photoelectrons.

C

- a. 4.13 eV.
- b. 2.46 eV.
- c. 1.67 eV.
- d. 6.59 eV.
- e. 0.54 eV.

6. A sodium surface is illuminated with light of wavelength 300 nm. The work function for sodium metal is 2.46 eV. Find the cutoff wavelength for sodium.

D

- a. 300 nm.
- b. 188 nm.
- c. 743 nm.
- d. 504 nm.
- e. 1,240 nm.

7. A proton has four times the momentum of an electron. If the electron has a de Broglie wavelength λ_e , what is the de Broglie wavelength of the proton?

B

- a. λ_e .
- b. $\lambda_e/4$.
- c. $4\lambda_e$.
- d. $\lambda_e/16$.
- e. $16\lambda_e$.

8. Of the following, which is the best evidence for the *wave* nature of *matter*?

B

- a. The interference pattern obtained when photons pass through a single slit system.
- b. The interference pattern obtained when electrons pass through a two-slit system.
- c. The photoelectric effect.
- d. Compton scattering.
- e. Blackbody radiation.

9. According to Heisenberg's uncertainty principle, the more accurately we know about a subatomic particle's momentum, the less we know about its precise:

- a. kinetic energy.
- b. mass.
- c. speed.
- d. location.
- e. energy.

D

10. An X-ray of energy 75.0 keV strikes an electron initially at rest. The X-ray is scattered through an angle of 75.0° compared to the incident direction. What is the new wavelength of the X-ray after scattering?

- a. 1.83×10^{-11} m.
- b. 1.48×10^{-11} m.
- c. 1.66×10^{-11} m.
- d. 1.80×10^{-12} m.
- e. 1.96×10^{-11} m.

A