

Formative: Monday, Dec. 12/16

Photons, Photoelectric Effect, deBroglie Wavelength and Energy Levels

1. If the half-life of carbon-14 is 5730 years, how many years would it take for 20 g of carbon-14 to decay to 0.625 g?
2. One energy level in a helium atom has a value of -21.4 eV.
 - a) Which excited state has this amount of energy?
 - b) Calculate the wavelength, in nm, of the radiation emitted in the transition of an electron from this level to the ground state in the helium atom.
3. The thorium isotope Th-227 has a half-life of 18 days. A particular radioactive source contains 4.0×10^{12} nuclei of the Th-227 isotope. Calculate the activity of the source after 36 days.
4. When light of frequency 8.6×10^{14} Hz is incident on a metal surface, the maximum kinetic energy of the photoelectrons is 0.500 eV. What is the work function of the metal?
5. If an electron has a speed of 1.0×10^4 m/s, what potential difference must be applied to stop the electron?
6. A photon with a wavelength of 1.5×10^{-8} m is emitted from an ultraviolet source. Calculate the wavelength of an electron with kinetic energy equal to the energy of the photon.