2017 Ph H1 Q10

Section: Particles and Waves

Topic: Forces on Charged Particles

Brief summary of the question

UV light with frequency f = 7.70×10^14 Hz ejects photoelectrons with K_max = 2.67×10^-19 J. Find the work function ϕ.

Worked solution

Photoelectric equation: hf = ϕ + K_max ⇒ ϕ = hf - K_max.

Planck ' s constant: h = 6.63×10^-34 J · s.

hf = (6.63×10^-34)(7.70×10^14) = 5.1051×10^-19 J.

ϕ = 5.1051×10^-19 − 2.67×10^-19 = 2.4351×10^-19 J ≈ 2.44×10^-19 J.

Final answer

B — 2.44×10^-19 J.

Revision tips

- **Think " incoming hf " splits into " ϕ to liberate " + " K_max to move. "**
- **If given f and K_max, compute hf first, then subtract.**
- **Keep units in joules unless asked for eV.**