Quantum Mechanics:
Homework on Introductory Concepts

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1. Assuming that the electron moves in a circular orbit in a Coulomb field, derive the Balmer formula for the spectrum of hydrogen atoms from the quantum condition

$$\oint p_i dq_i = n_i h \ ,$$

and the Bohr formula $\Delta E = h\upsilon$.

2. Ultraviolet light of wavelength 3500 Å falls on a potassium surface. The maximum energy of the photoelectrons is 1.6 eV. What is the workfunction of potassium?

3. The smallest separation resolvable by a microscope is of the order of magnitude of the wavelength used. What energy electrons would one need in an electron microscope to resolve separations of (a) 150 Å, (b) 5 Å ?