

Assignment #33

21.1 *Visible light having a wavelength of 6×10^{-7} m appears orange. Compute the frequency and energy of a photon of this light.*

21.7 *Compute the velocity of light in calcium fluoride (CaF_2), which has a dielectric constant ϵ_r of 2.056 (at frequencies within the visible range) and a magnetic susceptibility of -1.43×10^{-5} .*

21.28 *At the end of Section 21.14 it was noted that the intensity of light absorbed while passing through a 16-km length of optical fiber glass is equivalent to the light intensity absorbed through a 25-mm thickness of ordinary window glass. Calculate the absorption coefficient β of the optical fiber glass if the value of β for the window glass is $5 \times 10^{-4} \text{ mm}^{-1}$.*

21.D1 *Gallium arsenide (GaAs) and gallium phosphide (GaP) are compound semiconductors that have room-temperature band gap energies of 1.42 and 2.26 eV, respectively, and form solid solutions in all proportions. The band gap of the alloy increases approximately linearly with GaP additions (in mol%). Alloys of these two materials are used for light-emitting diodes (LEDs), in which light is generated by conduction band-to-valence band electron transitions. Determine the composition of a GaAs–GaP alloy that will emit red light having a wavelength of $0.60 \mu\text{m}$.*