

35. (a) Since the electron jumps from the conduction band to the valence band, the energy of the photon equals the energy gap between those two bands. The photon energy is given by $hf = hc/\lambda$, where f is the frequency of the electromagnetic wave and λ is its wavelength. Thus, $E_g = hc/\lambda$ and

$$\lambda = \frac{hc}{E_g} = \frac{(6.63 \times 10^{-34} \text{ J}\cdot\text{s})(2.998 \times 10^8 \text{ m/s})}{(5.5 \text{ eV})(1.60 \times 10^{-19} \text{ J/eV})} = 2.26 \times 10^{-7} \text{ m} = 226 \text{ nm} .$$

Photons from other transitions have a greater energy, so their waves have shorter wavelengths.

- (b) These photons are in the ultraviolet portion of the electromagnetic spectrum.