

**Exercise 3.1**  
**Calculating Frequency, Wavelength and Energy of Light**

1. Calculate the frequency of electromagnetic radiation whose wavelength is 365 nm.
  
2. Calculate the energy of a photon in a light beam with a frequency of  $2.4 \times 10^{16}$  Hz.
  
3. Calculate the energy of a photon in a light beam with a wavelength of 12  $\mu\text{m}$ .
  
4. Photon energies are often given in electron-volts (eV), with  $1 \text{ eV} = 1.602\,176\,565 \times 10^{-19} \text{ J}$ . Argon has a strong emission line with a photon energy of 17.1400 eV. Calculate the wavelength of this photon. Report your answer in nm.
  
5. A beam of blue light has a wavelength of 475 nm. The total energy of the light beam is  $2.50 \times 10^{-16} \text{ J}$ . How many photons are in the light beam?