

Answer on Question #62574 - Chemistry - General Chemistry

Question:

Infrared radiation has wavelengths ranging from about 800 nm to 1 mm. What is the frequency of radiation of wavelength 890 nm? Answer in units of s^{-1} .

Solution:

The relation between wavelength (λ) and frequency of electromagnetic oscillations (f) is described by the following expression:

$$\lambda = c/f,$$

where c – is the speed of light in vacuum = $3 \cdot 10^8$ m/s.

Derive f from above:

$$f = c/\lambda.$$

Calculate:

$$\lambda = 890 \text{ nm} = 890 \cdot 10^{-9} \text{ m} = 8.9 \cdot 10^{-7} \text{ m}$$

$$f = 3 \cdot 10^8 \text{ m/s} / 8.9 \cdot 10^{-7} \text{ m} = 0.34 \cdot 10^{15} \text{ s}^{-1} = 3.4 \cdot 10^{14} \text{ s}^{-1}.$$

Answer:

The frequency of radiation of wavelength 890 nm is $3.4 \cdot 10^{14} \text{ s}^{-1}$.