

Answer on Question 66561, Physics, Optics

Question:

Calculate the wavelength of the electromagnetic radiation with frequency $3 \cdot 10^{14} \text{ Hz}$. What is the type of radiation (Gamma rays, Visible, IR etc.)?

Solution:

For the electromagnetic waves, frequency has an inverse relationship to the wavelength λ :

$$f = \frac{c}{\lambda}$$

here, f is frequency, c is the speed of light in vacuum and λ is the wavelength.

So, from this formula we can find the wavelength λ :

$$\lambda = \frac{c}{f} = \frac{3.0 \cdot 10^8 \frac{\text{m}}{\text{s}}}{3.0 \cdot 10^{14} \text{ Hz}} = 1.0 \cdot 10^{-6} \text{ m} = 1.0 \mu\text{m} = 1000 \text{ nm}.$$

If we look at the electromagnetic spectrum scale, we can see that the radiation with the calculated wavelength $\lambda = 1000 \text{ nm}$ corresponds to the infrared radiation (from 700 nm to 1000000 nm).

Answer:

$\lambda = 1000 \text{ nm}$, infrared radiation.

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