Answer on Question #71056, Chemistry / General Chemistry

Question:
The wavelength of a particular colour of orange light is 632 nm.

The energy of this wavelength of light is _____ kJ/photon.

(109 nm = 1 m)

Solution:
According to the relation Planck-Einstein:

$$E = h\nu = \frac{hc}{\lambda} = 6.63 \cdot 10^{-34}(J \cdot s) \cdot \frac{3 \cdot 10^8 (m \cdot s^{-1})}{632 \cdot 10^{-9}(m)} = 3.15 \cdot 10^{-19} \left(\frac{J}{photon}\right)$$

$$= 3.15 \cdot 10^{-22} \frac{kJ}{photon}., or\ 3.15 \cdot 10^{-22} \cdot 6.02 \cdot 10^{23} = 189.2\ kJ/mol$$

Answer: The energy of this wavelength of light is 3.15·10^{-22} kJ/photon, or 189.2 kJ/mol.