Answer on Question 60455, Physics, Atomic and Nuclear Physics

Question:

An X-ray tube emits X-rays with a wavelength of $1.0 \cdot 10^{-11}\ m$. Calculate the energy, in electron volts, that the X-rays possess.

Solution:

There is an inverse relationship between the energy of the X-rays and its wavelength:

$$E = \frac{hc}{\lambda},$$

here, $h = 4.135 \cdot 10^{-15}\ eV \cdot s$ is the Planck's constant, c is the speed of light, λ is the wavelength of the X-rays.

Then, from this formula we can calculate the energy that the X-rays possess:

$$E = \frac{hc}{\lambda} = \frac{4.135 \cdot 10^{-15}\ eV \cdot s \cdot 3 \cdot 10^{8}\ \frac{m}{s}}{1.0 \cdot 10^{-11}\ m} = 124{,}05 \cdot 10^{3}\ eV.$$

Answer:

$E = 124{,}05 \cdot 10^{3}\ eV$.