Find the kinetic energy (J & eV), momentum, and velocity of an electron that has the same wavelength as a) orange light (600 nm) and b) blue light (475 nm).

Use MathCAD

Define some constants

$h := 6.62607015 \cdot 10^{-34}$ J-s $hmod := \frac{h}{2 \cdot \pi}$ $hmod = 1.05457 \times 10^{-34}$ J-s

$m0 := 9.1093837 \cdot 10^{-31}$ kg $qp := 1.6021766 \cdot 10^{-19}$ C

a) $\lambda orange := 600 \cdot 10^{-9}$ m

Use (2.2) $p = h / \lambda$ $porange := \frac{h}{\lambda orange}$ $porange = 1.10435 \times 10^{-27}$ kg m/s

$vorange := \frac{porange}{m0}$ $vorange = 1212.316$ m/s

Use (2.1) $T = 0.5mv^2$ $KEorange := 0.5 \cdot m0 \cdot vorange^2$ $KEorange = 6.69407 \times 10^{-25}$ J

$\frac{KEorange}{qp} = 4.17811 \times 10^{-6}$ eV

b) $\lambda blue := 475 \cdot 10^{-9}$ m

Use (2.2) $p = h / \lambda$ $pblue := \frac{h}{\lambda blue}$ $pblue = 1.39496 \times 10^{-27}$ kg m/s

$vblue := \frac{pblue}{m0}$ $vblue = 1531.346$ m/s

Use (2.1) $T = 0.5mv^2$ $KEblue := 0.5 \cdot m0 \cdot vblue^2$ $KEblue = 1.06809 \times 10^{-24}$ J

$\frac{KEblue}{qp} = 6.66646 \times 10^{-6}$ eV