

Atomic Theory Problems - Electromagnetic Radiation

Useful Equations: $c=f\lambda$ $E=hf$ $\frac{1}{\lambda} = R_H \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$ $R_H = 1.09678 \times 10^{-2} / \text{nm}$

$\Delta E = -1312 \text{ kJ/mole} \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$ $c = 3.00 \times 10^8 \text{ m/s}$ $h = 6.6260755 \times 10^{-34} \text{ J/Hz}$

1. What is the energy in blue light with a wavelength of 410 nm? $4.85 \times 10^{-19} \text{ J}$
2. What is the energy in red light with a wavelength of 656 nm? $3.03 \times 10^{-19} \text{ J}$
3. The energy of a photon of light is $3.85 \times 10^{-19} \text{ J}$, what is the wavelength? 516 nm
4. The energy of a photon of light is $8.35 \times 10^{-19} \text{ J}$, what is the wavelength? 238 nm
5. What is the wavelength of light when an electron moves from the 3rd energy level to the first energy level? What "color" is this light? 102.5 nm UV
6. What is the wavelength of light when an electron moves from the 6th energy level to the 2nd energy level? What "color" is this light? 410 nm violet
7. What is the energy in light generated by an electron going from the 5th energy level to the 3rd energy level? $1.55 \times 10^{-19} \text{ J}$
8. An electron starts on the third energy level and absorbs a photon of 1094 nm, where does it end up? 6th energy level