

From textbook: 1,3, 5, 7, 15, 25, 27,29,35, 45, 49, 51, 55, 57, 59, 121, 123, 125 and127

1. Calculate the wavelength (in nm) of blue light of frequency 6.40×10^{14} Hz.
2. Calculate the wavelength (in m) of radio waves corresponding to the FM station with frequency "92.1 on your dial" where the frequency is in MHz.
3. Calculate the frequency of blue light of wavelength 470 nm.
4. Calculate the frequency of radio waves of wavelength 3.50 m.
5. Calculate the energy per photon of microwaves of frequency 3.00×10^{11} Hz.
6. Calculate the energy per mole of ultraviolet radiation with a wavelength of 100.0 nm.
7. Calculate the energy per photon of radio waves of frequency 107.3 MHz.
8. Calculate the energy (KJ/ mol) of photons of blue light with a wavelength of 469 nm.
9. A CO₂ laser produces radiation of 10,600 nm. If the output is 0.150 J/pulse, how many pulses are required to produce 4.00×10^{20} photons?
10. A common way of initiating certain chemical reactions with light involves the generation of free halogen atoms in solution. If ΔH for the reaction $\text{Cl}_2(\text{g}) \rightarrow 2\text{Cl}(\text{g})$ is 242.8 kJ/mol, what is the longest wavelength of light that will produce free chlorine atoms in solution?
11. The longest wavelength of light that causes electrons to be ejected from the surface of a copper plate is 243 nm. What is the kinetic energy (KJ/ mol) of the electrons ejected when light of wavelength 200. nm shines on a copper plate?

12. When an atom undergoes a transition from a higher energy state to a lower energy state, the atom _____ electromagnetic radiation.
13. Calculate the de Broglie wavelength of a 155 g ball traveling at 85.0 miles per hour
14. Calculate the wavelength associated with an electron ($m = 9.109 \times 10^{-31}$ Kg) traveling at 40% the speed of light

Answers:

- | | | |
|------------------------------|-----------------------------|-------------------------------|
| 1. 468 nm | 2. 3.26 m | 3. 6.38×10^{14} Hz |
| 4. 8.57×10^7 Hz | 5. 1.99×10^{-22} J | 6. 1.198×10^6 J/ mol |
| 7. 7.107×10^{-26} J | 8. 256 kJ/ mol | 9. 50.0 pulses |
| 10. 492.6 nm | 11. 106 KJ/ mol | 12. emits |
| 13. 1.12×10^{-34} m | | |