

06/16/23

Green light has a wavelength of 550 nm. How much energy does 1 mole of green photons contain?

The NIF (National Ignition Facility) is a lab where nuclear fusion is being studied. To make this happen, they direct 1.8×10^6 J of laser light (with a wavelength of 351 nm) onto a tiny target to try to start the fusion process. How many photons of light is this?

All of the energy described above is delivered to the target in 2.4 nanoseconds. Power is defined as energy per unit time and 1 Watt = 1 Joule/second. How many watts of power is a pulse laser light at the NIF? For comparison, the sum total of electricity generation in the US is about 1000 gigawatts.

The line of light from the hydrogen discharge lamp result from an electron making a transition that ends at the $n=2$ level. The wavelength of the red line is 656.2 nm, the wavelength of the aqua line is 486.1nm and the wavelength of the blue/purple line is 434.0 nm. Which transition is responsible for each line (i.e. which n level did the electron start from)?

If you want to excite an electron from the $n=3$ level to the $n=6$ level, you can shine light of the appropriate wavelength/frequency on the sample. What wavelength of light is required to do this?