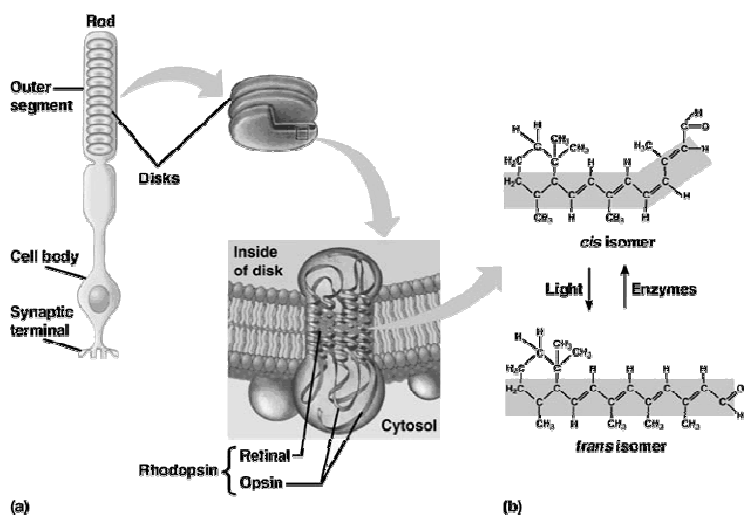


- The human eye contains a molecule called 11-cis-retinal that changes conformation when struck with light of sufficient energy. The minimum energy required to change the conformation of 11-cis-retinal within the eye is about 164 kJ/mol. Calculate the longest wavelength visible to the human eye.



EQUATIONS

$E = h\nu$
 $c = \nu\lambda$

$h = 6.63 \times 10^{-34} \text{ Js}$
 $c = 3.00 \times 10^8 \text{ m/s}$
 $N_A = 6.22 \times 10^{23}$

- A modern compact fluorescent lamp contains 1.4 mg of mercury. If each mercury atom in the lamp were to emit a single photon of wavelength 254 nm, how many joules of energy would be emitted?
 - $7.8 \times 10^{-19} \text{ J}$
 - 3.3 J
 - $6.6 \times 10^2 \text{ J}$
 - $3.3 \times 10^3 \text{ J}$
 - $4.2 \times 10^{18} \text{ J}$
- Which of the following is not a possible combination of quantum numbers. Explain your choice.
 - 4 2 -1 +1/2
 - 5 4 -5 -1/2
 - 4 3 -2 +1/2
 - 4 0 0 -1/2
- A laser pulse with wavelength 532 nm contains 4.67 mJ of energy. How many photons are in the laser pulse?
- Match the scientists: Planck, Bohr and Einstein with the three following events:
 - Explanation of the photoelectric effect
 - Explanation of black body radiation
 - Explanation of atomic emission spectra (especially for Hydrogen)