

Molecular Photonics

Exercise 1

- Express the energy of a 470 nm photon in Kcal/mol, KJ/mol, eV, and $\bar{\nu}$.
- Calculate the oscillator strength of an electron that translates 0.3 nm upon excitation with the above-mentioned photon.
- Write down an explanation together with a schematic drawing to what will be the differences between potential energy curves of two atoms bonded to each other (i.e. X-Y) when X and Y are light atoms and when X and Y are heavy atoms?
- Explain shortly together with schemes of potential energy curves:
 - What is the connection between Born-Oppenheimer, Frank-Condon and the shapes of UV-vis spectrum of flexible and rigid π systems? Give examples of transitions in rigid and flexible cases using potential energy curves.
 - Explain what will happen to the above spectra when we will consider the solvent effect. (molecules in solution)
- Draw and explain two examples of potential energy curves that show: a) efficient radiationless transition; b) poor radiationless transition between the excited state and the ground state.
- Arrange the molecules according to their transition dipole. Give short explanation.

