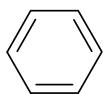
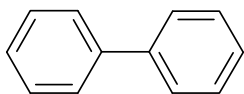


1. (4 points) How do you explain the fact that λ_{\max} for compounds **I** and **II** are vastly different whereas those of **III** and **IV** are very similar?



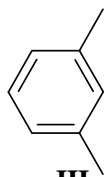
I

204 nm



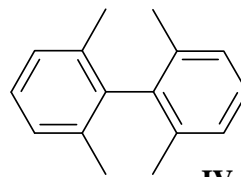
II

246



III

211



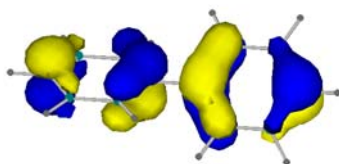
IV

218

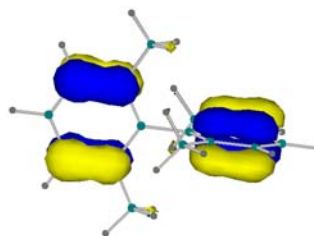
I and II: II more or less planar, extended conjugation over both rings

III and IV: IV considerably twisted, conjugation only over one ring as in III;

IV is just twice III



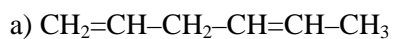
twist: 40°



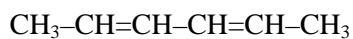
90°

For these conjugation issues in acyclic molecules, it is always important to verify planarity or deviation from it. You might want to build the molecules to convince yourself of the twist!

2. (4.5 points) Predict whether UV-VIS spectroscopy can be used to distinguish between the following isomers. Estimate λ_{max} (there may be more than one) for each.

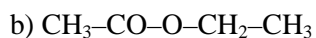


and

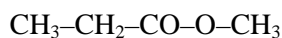


yes 175 nm

224 nm (214 + 2×5)

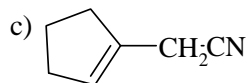


and

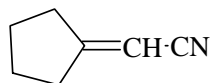


no 205 nm

205 nm (no change in chromophore)

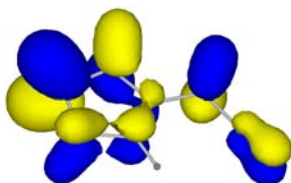
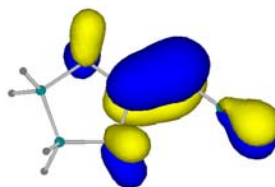
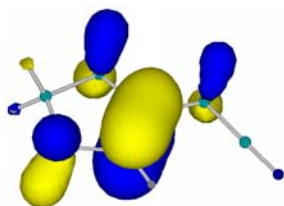


and



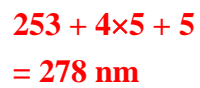
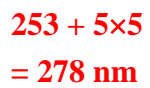
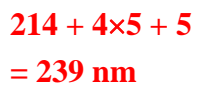
yes 175 and 160 nm

maybe 195 nm (175 + 20: effect of CN on other systems)



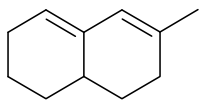
The “yes” here means “can be used”. Simply providing the numbers will not get you full points, because the question asks for an evaluation of those numbers (“are the numbers different enough?”).

3. (4 points) Can you distinguish between the following three isomeric acids by UV spectroscopy? Use the Woodward-Fieser rules to predict each λ_{max} .



-> cannot distinguish between 2 and 3

4. (3 points) A diene $C_{11}H_{16}$ was thought to have the structure below. Its UV spectrum showed a λ_{\max} of 263 nm. Can the structure below be correct? If not, draw a structure with the same skeleton that satisfies the spectral data.



214 + 4×5 + 5 = 239 nm, too far off. Probably due to wrong base system: must be cisoid!

263 – 253 = 10 nm -> 2×5, 2 alkyl substituents:

