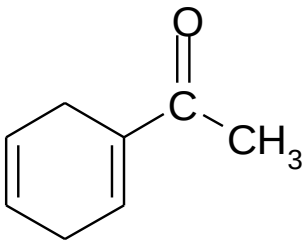
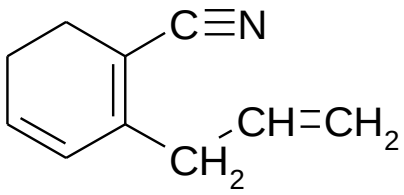
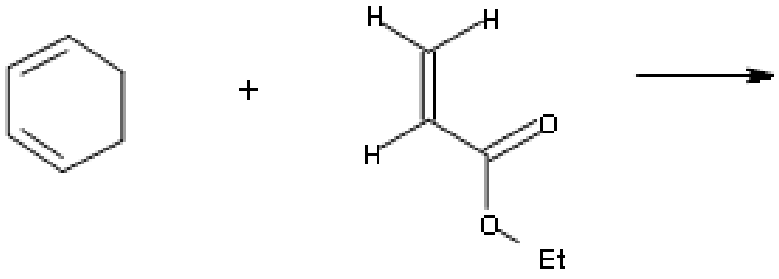
CHM 2211 – Ch 14 Homework

1. Identify (circle) the conjugated portions of the molecules below. Determine the hybridization of each atom in the conjugated Π system. Also, determine the total number of conjugated atoms in each molecule. Do not include any sp^3 atoms. (0.5 pt ea)



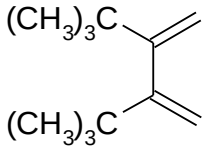


2. Use curved arrows to show the pericyclic mechanism for the Diels-Alder cycloaddition reaction between 1,3-cyclohexadiene with ethyl propenoate (below). Use a modeling kit, if necessary, to determine the structure of the product. Draw the product in 2D (flat), at first, by keeping the cyclohexene ring intact, and attach the dienophile portion to its top and bottom C's to make the bicyclic structure. Review section 14.5, along with exercises 14.21 and 14.40b, to see how to draw similar polycyclic molecules. Then, draw the product in 3D. (2 pts)



3. Use curved arrows and skeletal structures to draw the mechanism, including the cation resonance forms and the two different products, for the reaction of 5,5-dimethyl-1,3-cyclohexadiene with one equivalent of HCl. Explain how different product mixtures (1,2 vs. 1,4) occur in terms of kinetic (0 ^{o}C) and thermodynamic (40 ^{o}C) control. (2 pts)

4. Make a molecular model of the following molecule with all of the H atoms on it. Explain whether or not the following molecule would be a good reactant for a Diels-Alder reaction. Examine both cases: diene and dienophile. Review section 14.5 (Diels-Alder reactants), especially Figures 14.8 and 14.9. (2 pts)



5. Visible light causes the cis to trans isomerization of rhodopsin to metarhodopsin II. Explain the process in terms of the Π (bonding) to Π* (antibonding) transitions. Review sections 7.4 (cis/trans isomerism) and 14.9 (vision) in McMurry, as well as the chapter 14 class notes. (2 pts)

6. Review sections 14.8 and 14.9 in McMurry. Describe the factors affecting the λ_{max} (wavelength) positions for 1,3,5-hexatriene, 1,3,5,7-octatetraene, and β-carotene. (1 pt)