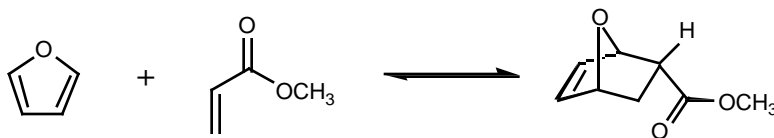


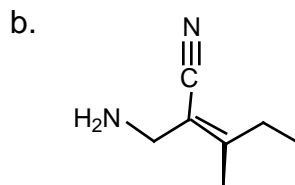
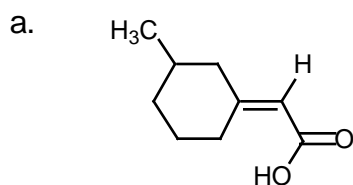
1. The following is an example of a Diels-Alder reaction which you will learn more about next semester. This reaction is believed to proceed through a single step. At room temperature, the reaction enthalpy is $-9.1 \text{ kcal} \cdot \text{mol}^{-1}$ and the entropy is $-0.027 \text{ kcal} \cdot \text{mol}^{-1}$. Calculate the equilibrium constant for the reaction. Show all your work. (You do not need to know anything about the Diels-Alder Reaction to answer the question.) (5 pts)



2. a. Calculate the degrees of unsaturation of a compound with the formula $\text{C}_{11}\text{H}_{13}\text{Cl}_2\text{NO}_3$. (3 pts)

b. What does this mean? (2 pts)

3. Designate the following alkenes as (E) or (Z). (4 pts)



4. Give the product for the electrophilic addition of HCl to 1-(1,1-dimethylethyl)-cyclohexene. Draw the most stable chair conformation of the product. (5 pts)

5. Give the mechanism for the free radical chlorination of methane to chloromethane. (6 pts)

Problem 1: _____ (5 pts) 2: _____ (5 pts) 3: _____ (4 pts)

4: _____ (5 pts) 5: _____ (6 pts)

Total out of 25: _____