**Special Topics in Fine Chemicals 2008 3rd Exam Student ID # Name**

*Total 110 points. Write your answers in the space provided. If you need more space, write on the back.*

1. (15 points) Explain the following Diels-Alder reaction results. You have to compare the rate differences one by one. It is also required to show the frontier molecular orbitals involved in order to rationalize the electronic effect on the reaction rate.



2. (20 points) Predict the products of the following pericyclic reaction by heating compounds **A** and **B** when R is Me or CH2CH2CO2H. Indicate clearly the stereochemistry of each product and explain.



3. (10 points) Four possible products can be assumed from the following reaction of compound **C** but only two compounds are observed as a mixture. Explain what the four possible products are and why only the two products are detected. Indicate also which would be a major compound and explain why.



4. (10 points) Propose any synthetic scheme to prove that an ester pyrolysis occurs with a *syn* elimination.

5. (10 points) Suggest two reagents and the following necessary transformations to produce the target product from cyclohexadiene. Explain why the D-A reaction with acetylene does not work.



6. (9 x 5 points) Write the structure of the major products for the following reactions. Please pay attention to the stereochemical results in the products where appropriate.

















