

Fourth Year Chemistry      **Course:** Pericyclic Reactions and Biochemistry (Chem 405)

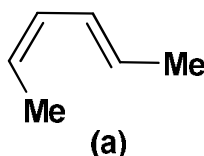
Answer **all** questions: (135 Marks)

**Date:** 13-01-2013

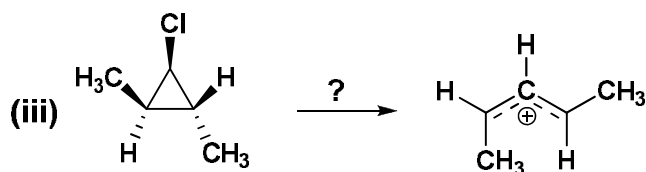
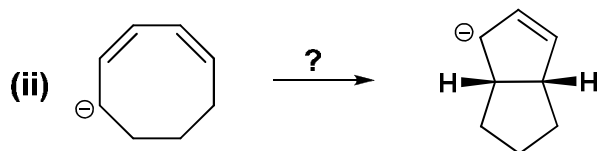
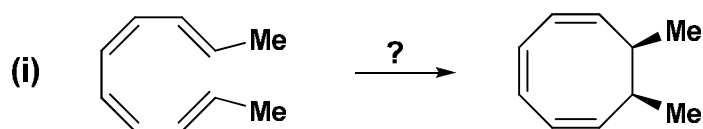
**Time:** 3hrs.

**Pericyclic Reactions (90 Marks)**

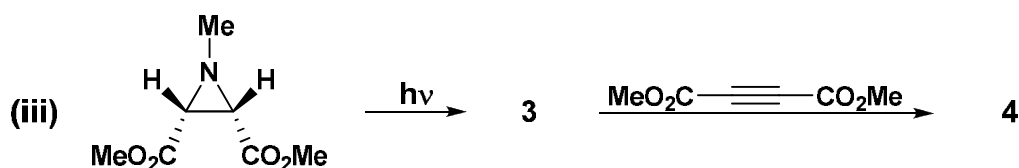
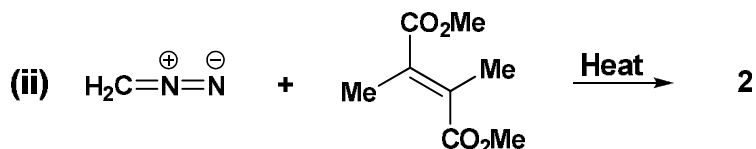
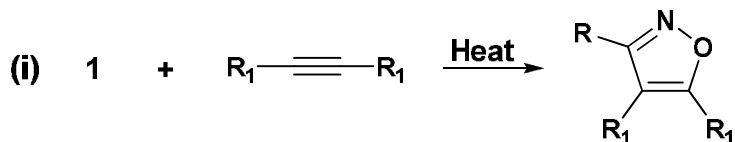
(1) (a) Write the structures of the products for the thermal electrocyclic reaction for compound (a) and show the terminal orbitals during the course of reaction. In addition, specify the type of rotation and write the names of the reactants and products? (8 marks)



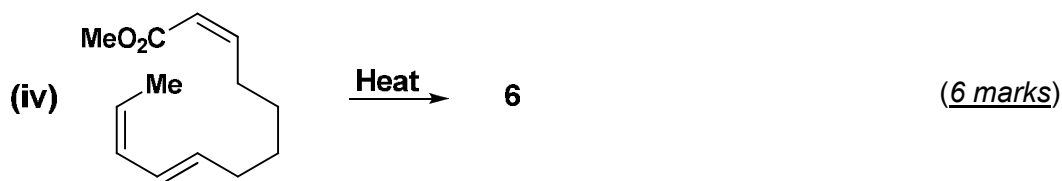
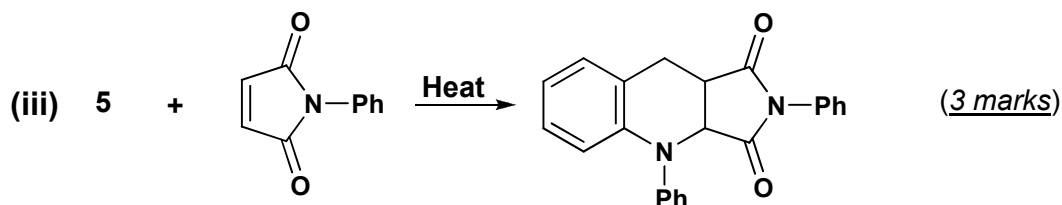
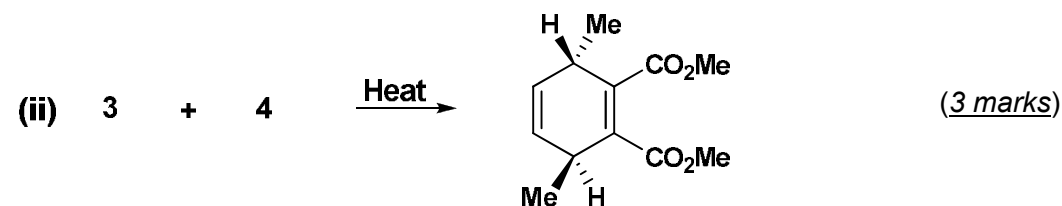
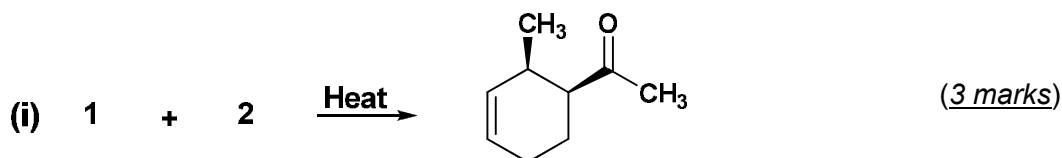
(b) Based on the stereochemistry of the reactant and of the product, indicate if a **conrotatory** or **disrotatory** process is responsible for each transformation and specify whether they proceed **thermally** or **photochemically**. Mechanisms are not needed. (9 marks; 3 marks each)



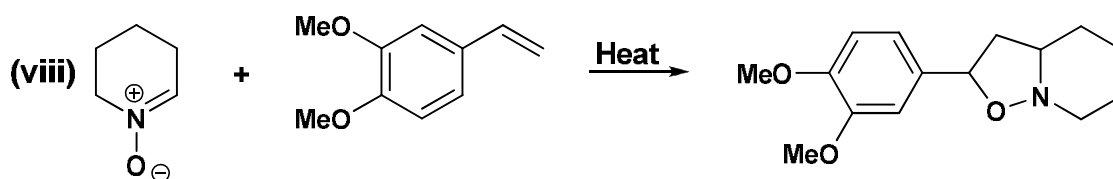
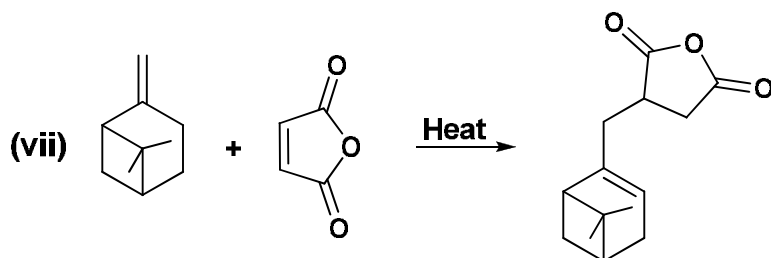
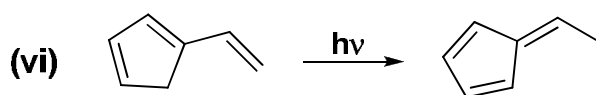
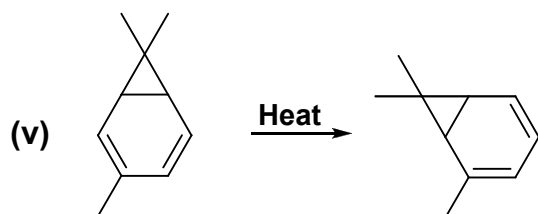
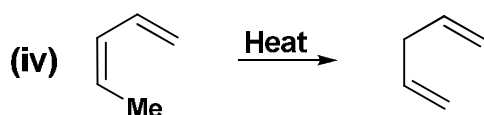
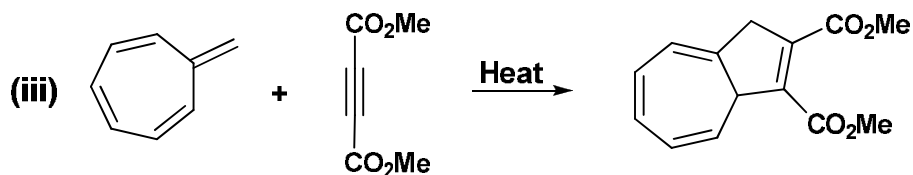
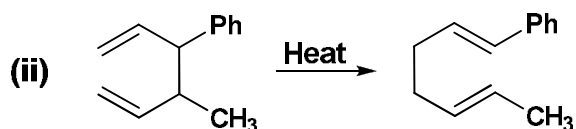
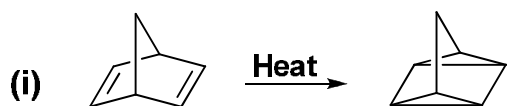
(c) **Complete** the following equations and **show the stereochemistry** when appropriate. Mechanisms are not needed. (12 marks; 3 marks each)

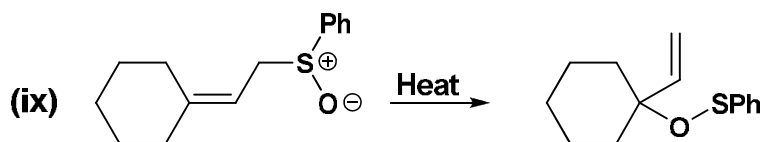


(d) For each of the following Diels-Alder reactions, **provide the structure** of the missing reagent(s) or product. To receive full credit, be sure to **include stereochemistry** when appropriate. Mechanisms are not needed. (15 marks)

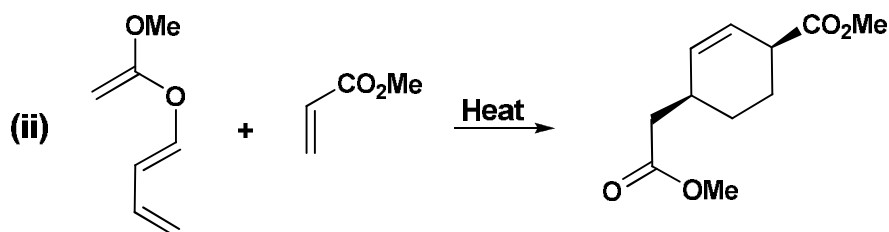
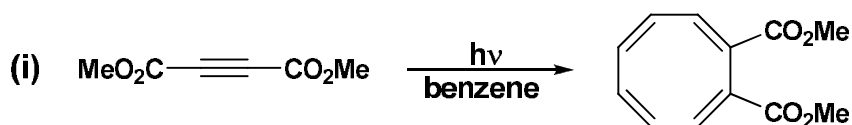


(2) (a) Define the type of the following pericyclic reactions. Specify **whether** the reaction **takes place or not**. If the reaction is *cycloaddition* or *sigmatropic reactions*, define the order of the reaction (e.g. [2 + 2]; [1,5] hydrogen shift). Mechanisms or explanations are not needed. (30 marks; 3 marks each)

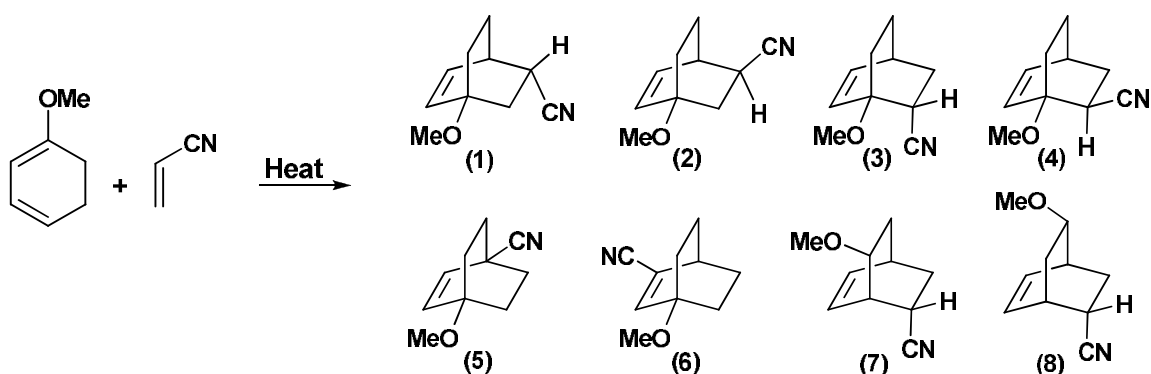




(b) Using curved arrows, **write** the mechanisms for the following reactions. Do not combine steps. Molecular orbital analysis is not required. (12 marks)



(c) **Circle** the correct product. Mechanisms or explanations are not required. (4 marks)



*With my best wishes*

*Dr. Ali El-Agamey*