Note: problems 1-4 include electrocyclic reactions, 5-9 cycloadditions, and 10-14 sigmatropic shifts.

1. Explain whether each reaction is thermally or photochemically allowed as concerted processes.



1. Show the thermal mechanisms, (and stereochemistry of each step as applicable) and identify the process (4n or 4n+2) for each of the following products. Show appropriate conformations in each step.

 

1. Show the mechanisms, (and stereochemistry of each step as applicable) and identify the process (4n or 4n+2, electrocyclic, [x,y]-sigmatropic shift, cycloaddition, suprafactial, antarafacial, etc.) for each of the following products. Show appropriate conformations in each step.



1. Show a mechanism for each of the following reactions. Indicate if the processes are conrotatory or disrotatory and stereochemistry of product.

 

1. Which of the following reactions are allowed? Identify interaction topology of Frontier Orbitals (supra, antara). Identify orbitals that determine if the following reactions are allowed or forbidden as a concerted process.







1. Which of the following reactions are allowed? Identify orbitals that determine if the following reactions are allowed or forbidden as a concerted process.

 



1. Show a mechanism for each of the following reactions.

  

1. Show structures of principle products for each of the following reactions. Show stereochemistry where determined by starting materials.

 

1. Show structures of principle products for the following reactions. Show stereochemistry determined by starting materials. Indicate Frontier Orbitals controlling the stereochemistry.



1. Classify the following sigmatropic shifts and indicate which are theoretically allowed concerted reactions and which are forbidden.

 

1. Classify the following sigmatropic shifts and indicate which are theoretically allowed concerted reactions and which are forbidden. Identify the orbitals (i. e. 1 or 2 etc.) that control the reaction.

 

1. Show the mechanism for the following reactions. Identify the kind of shift that is observed.

 



1. . Show the mechanisms, (and stereochemistry of each step as applicable) and identify the process (4n or 4n+2, electrocyclic, [x,y]-sigmatropic shift, cycloaddition, suprafacial, antarafacial, etc.) for each of the following products. Show appropriate conformations in each step.

 

1. Show the mechanism expected for the following reactions. Indicate the type of rearrangement and topology.



