Chem 332

Exam 2

2010

Prof Fox

50 minutes

80 points

The exam is closed book

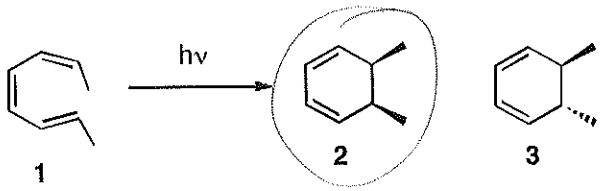
Write your name on every page

Name KEY

Chem 332, 2010, exam 2

Your Name key

1. Does the photochemical isomerization of **1** lead to compound **2**, compound **3**, or a mixture of both? Circle the correct product(s). Explain your answer in detail using an argument based in molecular orbital theory; a correct answer will predict if this reaction will proceed via conrotatory or disrotatory electrocyclic ring closure. (15 points)
NO CREDIT will be awarded for simply circling the correct product



ϕ_6 U —

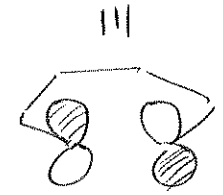
ϕ_5 L —

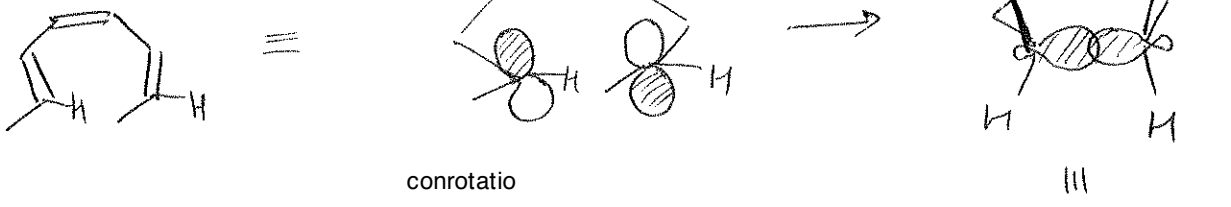
ϕ_4 U — $\xrightarrow{h\nu}$ ↑ PHOTOHOMO IS ϕ_4 : UNLIKE SYMMETRY.

ϕ_3 L ↑↓

ϕ_2 U ↑↓

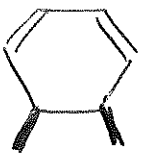
ϕ_1 L ↑↓





conrotatio

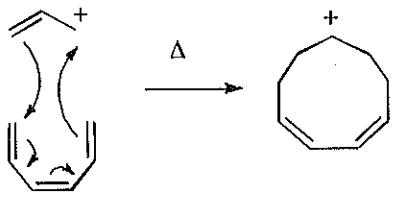
III



Chem 332, 2010, exam 2 Your Name_____

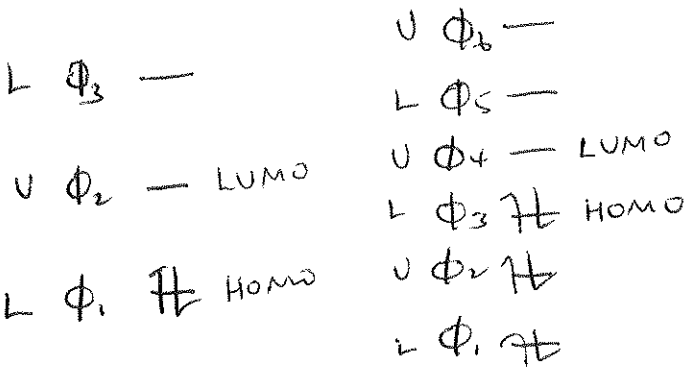
(25 points)

2. Consider the thermal reaction shown below. Would you expect this to be a concerted process under thermal conditions? Explain in detail using an argument based in molecular orbital theory.



CycloADDITIONS require combination of the HOMO of ONE reACTANT + LUMO of the other.

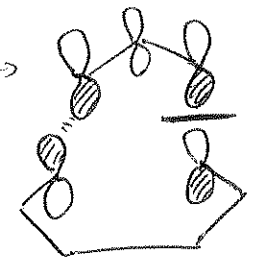
3 π, 2e⁻ 6 π, 6e⁻



We can consider the combination of Φ_1 (allyl) & Φ_4 ()

LIKE symm. Φ_1 →

UNLIKE sym. Φ_4

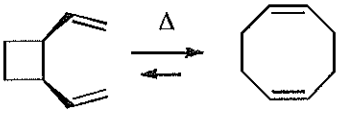


← ANTIBONDING

Because the symmetry results in an antibonding interaction, this cycloaddition is not concerted.[3]

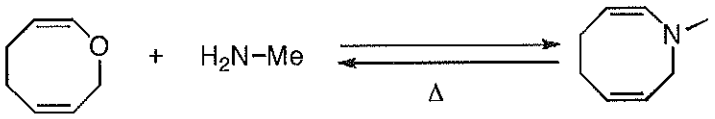
- Analysis with Φ_2 (allyl) + Φ_3 () reaches a similar conclusion

3. Provide a detailed arrow pushing mechnism. Your answer does NOT require molecular orbital analysis.

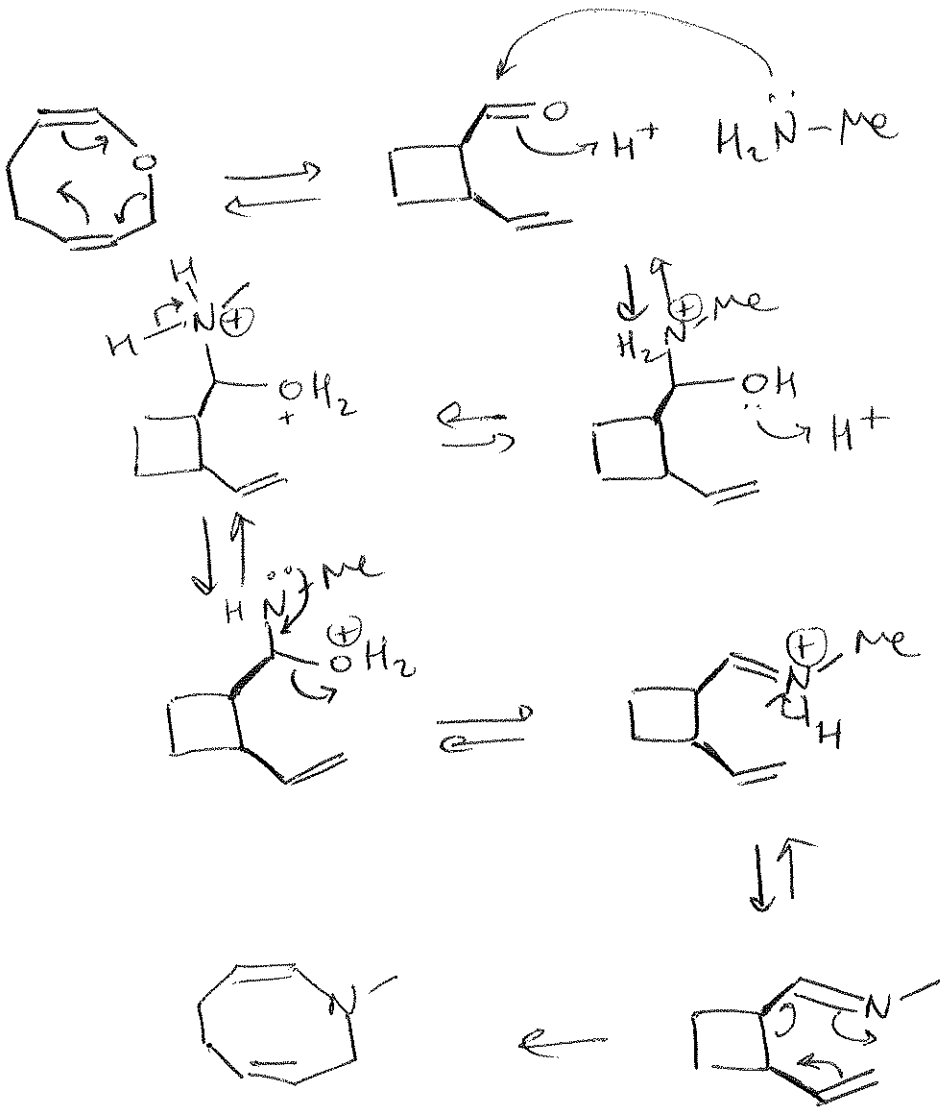


(5 points)

4. Provide a detailed arrow pushing mechnism. Your answer does NOT require molecular orbital analysis.



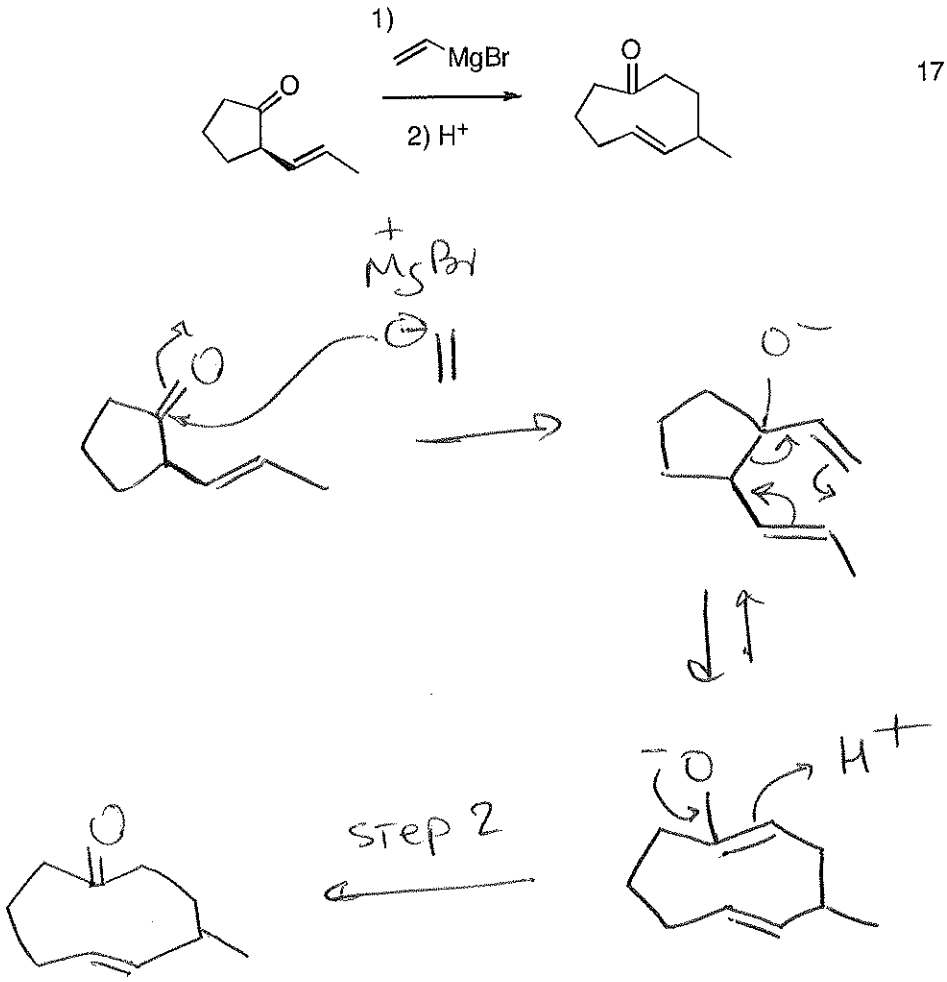
18 points



Your Name key

5. Provide a detailed arrow pushing mechnism. Your answer does NOT require molecular orbital analysis.

17 points



Scratch paper