

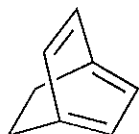
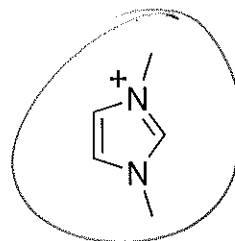
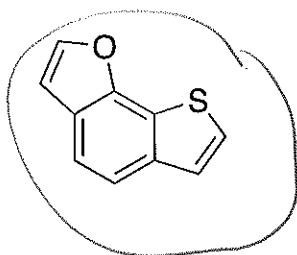
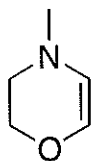
Chem 332
Exam 2
2009
Prof. Fox
50 minutes
80 points

Show your work in detail

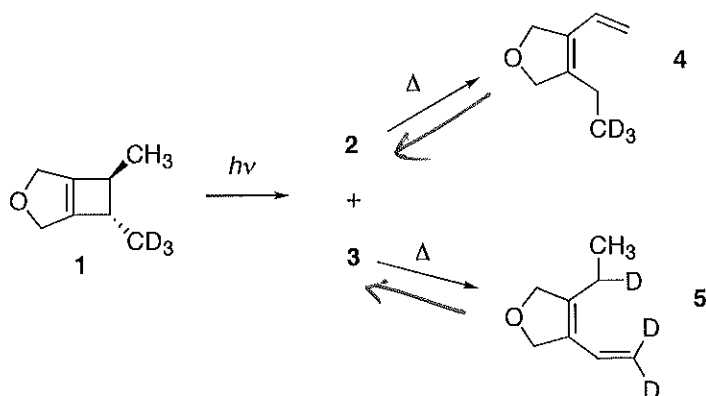
WRITE YOUR NAME ON EVERY PAGE

NAME _____

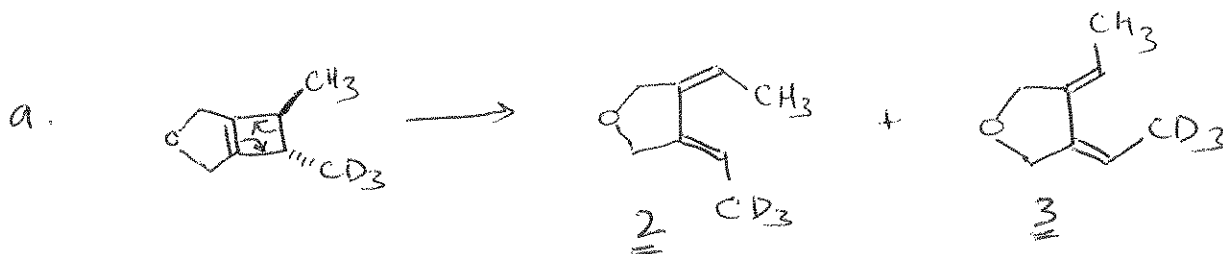
1. Circle the molecules that are aromatic. No partial credit. 3 points each



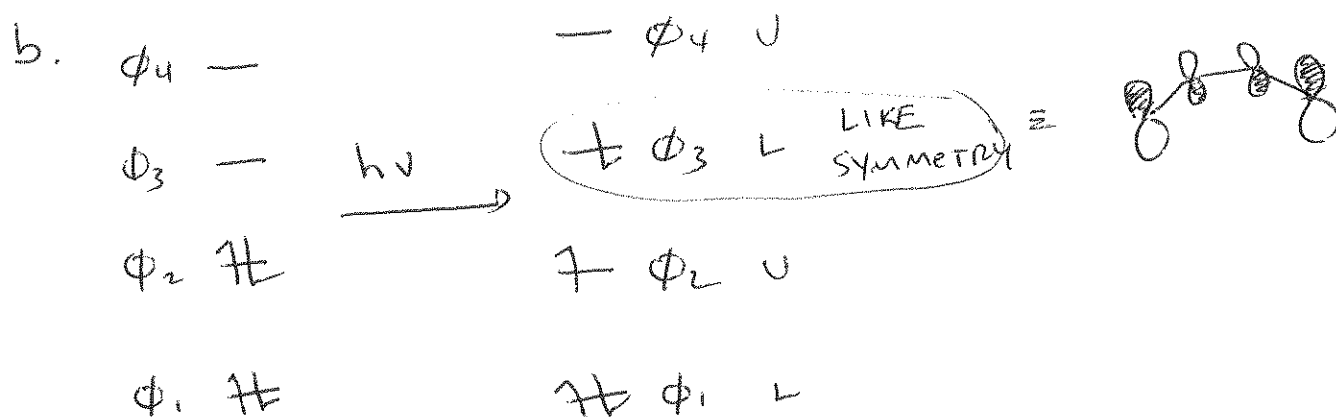
2. Photolysis of compound **1** leads to equal amounts of two products— **2** and **3**. Upon heating, **2** leads exclusively to compound **4**, and **3** leads exclusively to **5**. (25 points)



- Provide structures for **2** and **3**, and an arrow pushing mechanism for their formation.
- Use molecular orbital theory to explain the stereoselectivity for the formation of compounds **2** and **3**.
- Provide an arrow pushing mechanism for the conversion of **2** into **4**, and for the conversion of **3** into **5**. Molecular orbital analysis is NOT required for this subquestion.



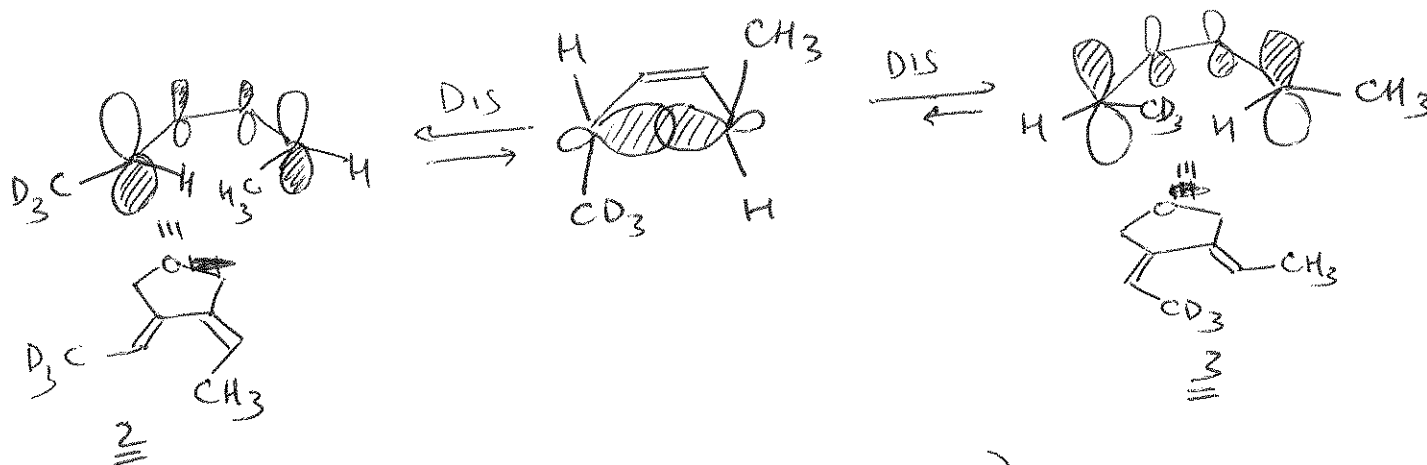
FIND the HOMO (photochemical) for BUTADIENE



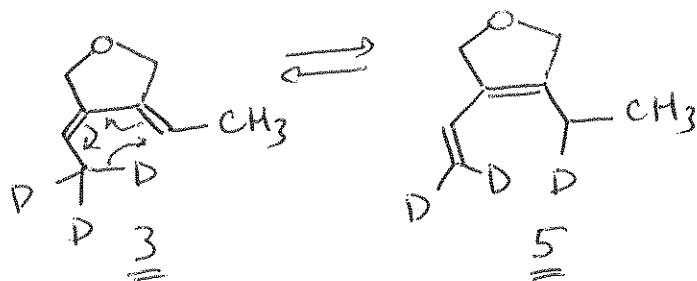
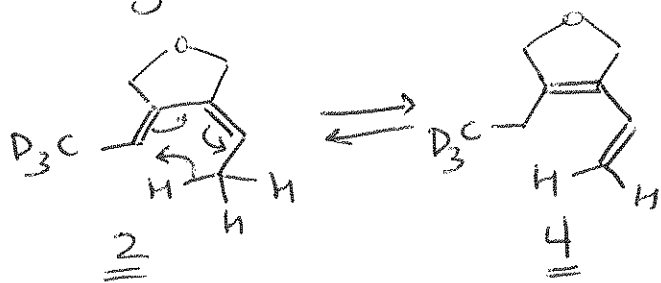
Continue your answer on the next page

2. continued

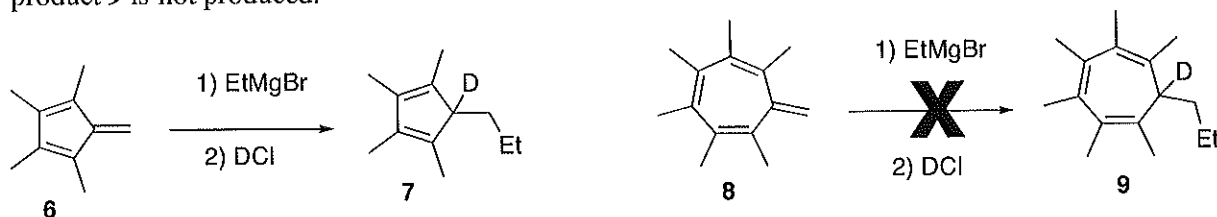
2b (CONT) Because the HOMO has "like" symmetry, ~~the~~ the electrocyclic ring opening is DISROTATORY. TWO DISROTATIONS ARE POSSIBLE.



2c BOTH 2 and 3 UNDERGO (REVERSIBLE) $[1,5]$ -HYDRIDE SHIFTS TO GIVE 4 and 5, respectively.

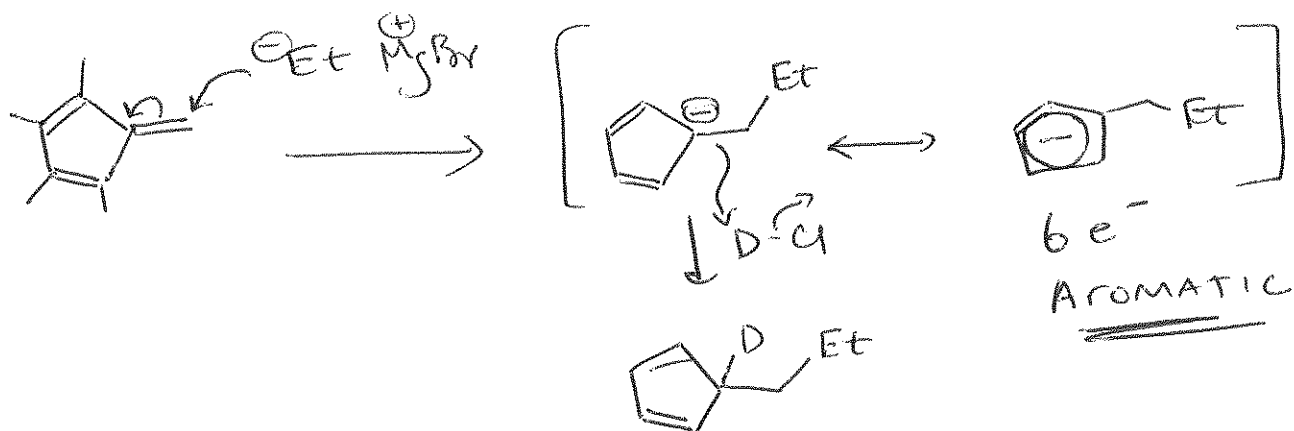


3. Compound **6** reacts with EtMgBr to give an anionic product that, upon treatment with DCl, produces **7**. However, an attempt to carry out a similar reaction with **8** is unsuccessful, as product **9** is not produced.

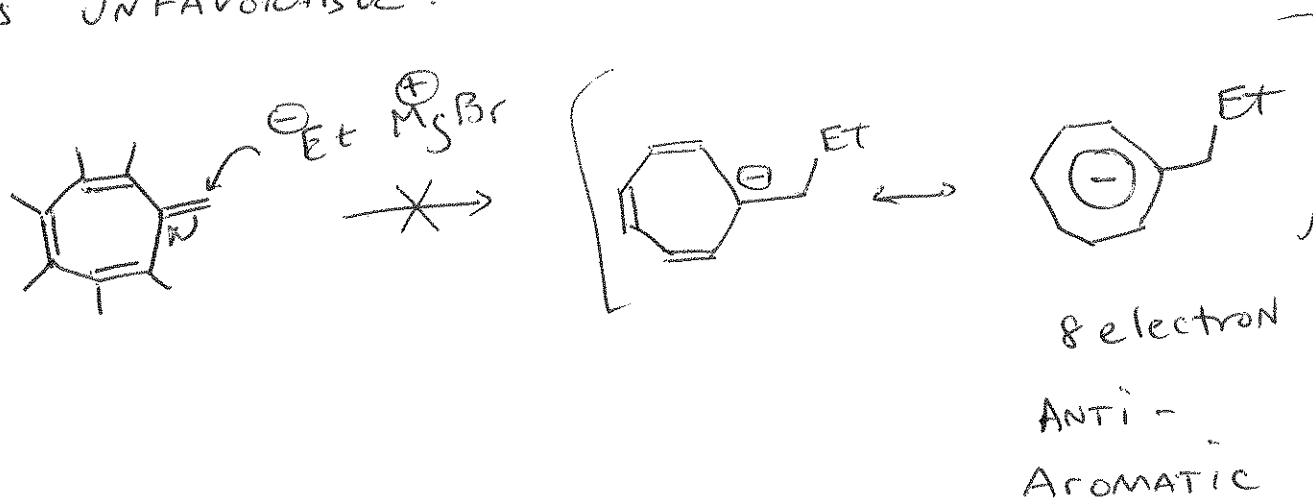


Explain why the reaction to form **7** is successful. Explain why the reaction to form **9** is unsuccessful. (20 points)

• $\text{Et}^{\ominus}\text{Mg}^{\oplus}\text{Br}$ ADDS to 6 to give AN AROMATIC ANION



• SIMILAR REACTION WITH 8 WOULD GIVE AN ANTI AROMATIC, 8 electron ANIONIC SPECIES. THIS IS UNFAVORABLE!



4. Provide a detailed arrow pushing mechanism. Molecular orbital analysis is NOT required. (20 points)

