CHEM6394: Stereochemistry Final Exam

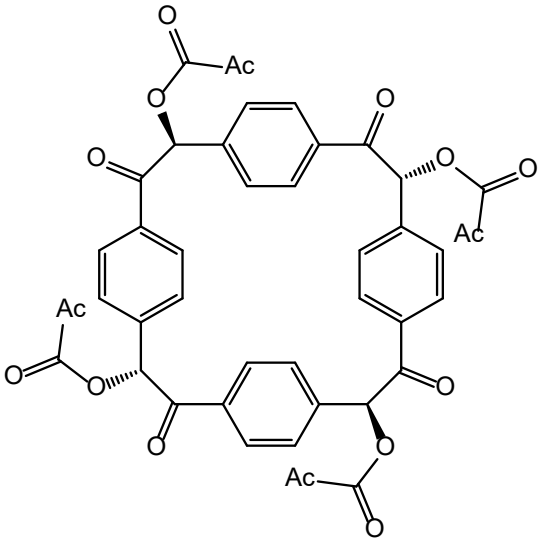
Prof. Ognjen Š. Miljanić May 10, 2022

Name: _____ Last 4 Digits of Student ID Number: _____

(print legibly) Last First

Read all directions very carefully. Write your answer legibly in the designated spaces. Total number of points is 350. This exam is supposed to have eight (8) pages, with the last page intentionally left blank.

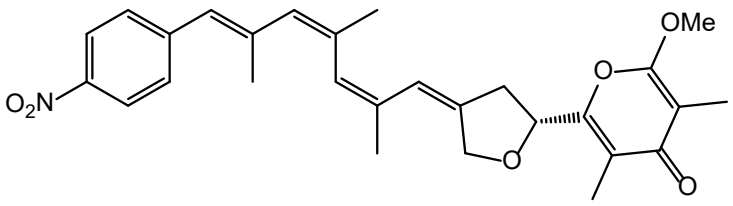
1. Is the molecule below chiral or achiral? Provide a detailed explanation of your answer and refer to symmetry elements (or absence thereof) that justify your answer. *50 points*



DO NOT WRITE IN THIS SPACE

FINAL SCORE

2. The compound on the bottom undergoes two consecutive electrocyclizations—first an eight-electron one, and then a six-electron one. Draw the structure of the final product with a complete description of its stereochemistry. *50 points*



3. Draw a qualitative conformational energy diagram of methylcyclohexane, keeping in mind that its two chair conformations (as well as its four boat conformations) are not the same in energy. In other words, this diagram will look quite different than the one for cyclohexane. *45 points*

4. Define, in your own words, the following terms. Be succinct but precise, and feel free to use chemical structures to illustrate your definitions. *8 × 5 = 40 points*

atropisomerism

parity violation

anancomeric

gauche conformation

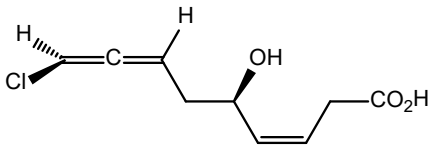
Cram-Felkin-Anh rules

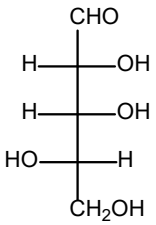
circularly polarized light

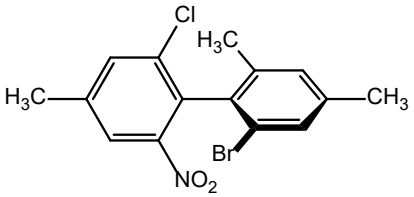
stereoselective reaction

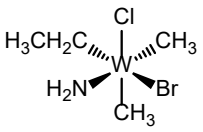
cheletropic reaction

5. Assign the configurations of the following molecules using stereochemical designators: *R*/*S*, *P*/*M*, *A*/*C*, *Δ*/*Λ*, *E*/*Z*, etc. In compounds with multiple stereocenters, assign the configuration of each one. *65 points*



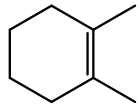


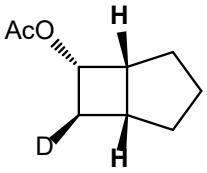




6. Draw the products of the following reactions, including a detailed representation of their stereochemistry.

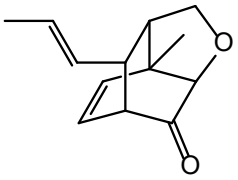
10 × 10 = 100 points



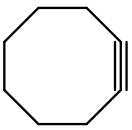


1,3-sigmatropic shift

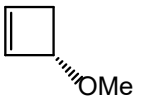
complete the structure



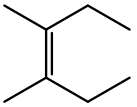
Cope rearrangement



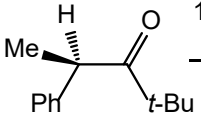
H_2
Lindlar's catalyst



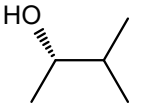
electrocyclic ring opening



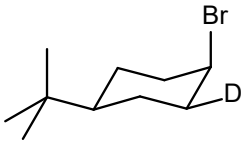
(*S*,*S*)-diethyltartarate
t-BuOOH / Ti(O*i*-Pr)$_4$



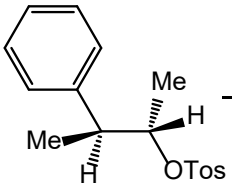
1) PhMgBr / Et_2O
2) H_3O^+



HBr



strong bulky base



AcO^- / Δ

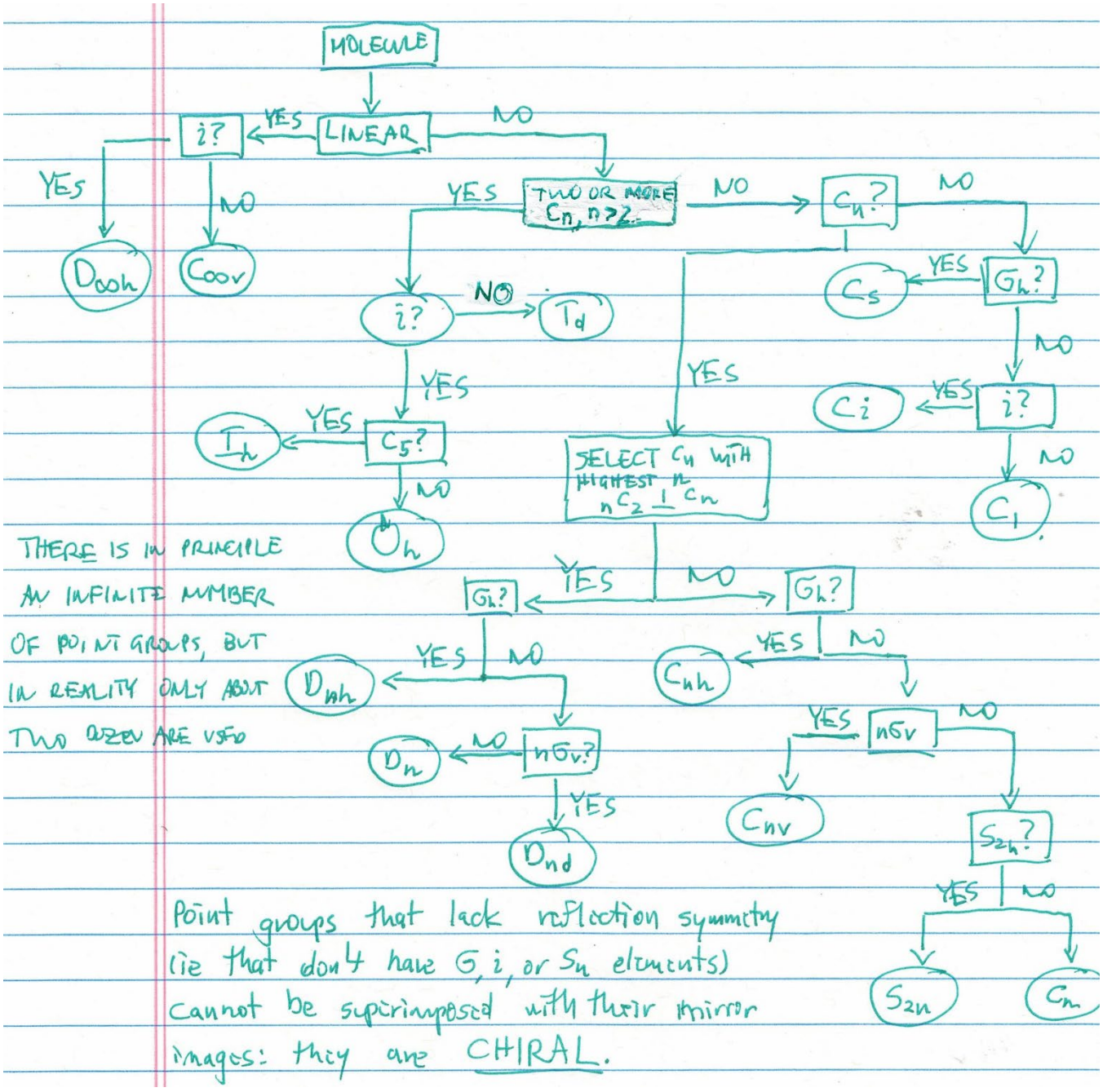



Chart for the Determination of Point Groups