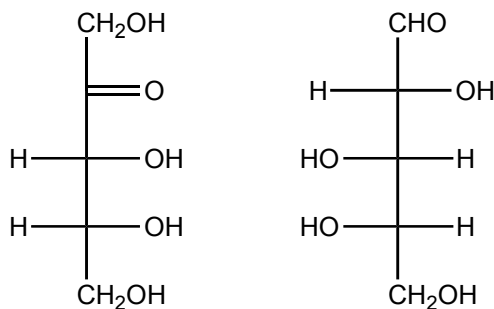


## Practice Midterm 1 - B

### Part 1 Multiple Choice

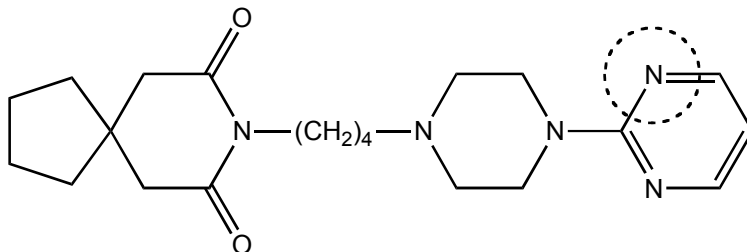
1. What is the relationship between these two compounds?

- A. Conformers
- B. Constitutional isomers
- C. Diastereomers
- D. Enantiomers
- E. Identical



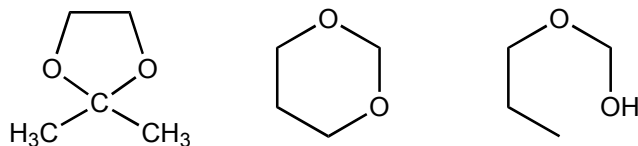
2. What is the hybridization of the nitrogen atom that is circled?

- A.  $\text{sp}$
- B.  $\text{sp}^2$
- C.  $\text{sp}^3$
- D.  $\text{sp}^3\text{d}$
- E.  $\text{sp}^3\text{d}^2$

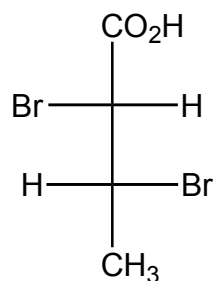


3. What are the functional groups of these structures? In order from left to right:

- A. Acetal, ketal, hemiacetal
- B. Ketal, acetal, hemiketal
- C. Acetal, ketal, hemiketal
- D. Ketal, acetal, hemiacetal
- E. Hemiacetal, hemiketal, acetal
- F. Hemiketal, hemiacetal, ketal
- G. Hemiacetal, Hemiketal, ketal
- H. Hemiketal, hemiacetal, acetal

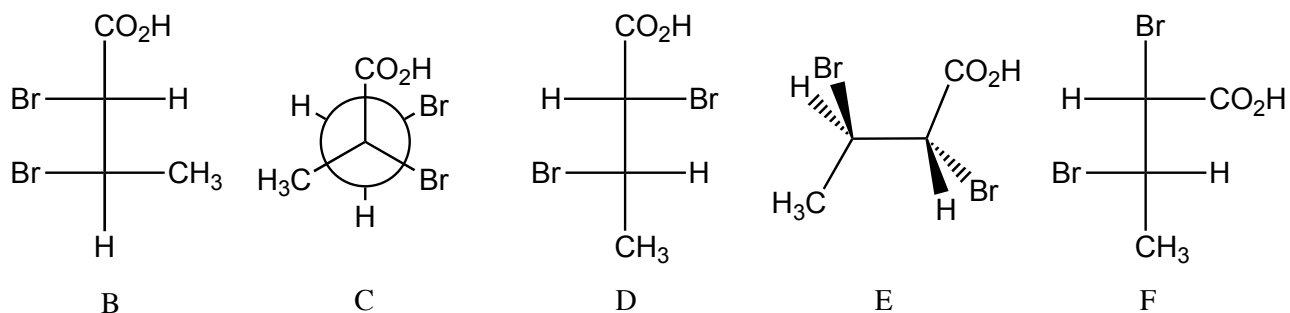


4. Structure A is shown below.



Structures B-F are shown below.

Answer the following questions by circling the appropriate letter. Conformational isomers are considered identical in question i.



- i) Which structure is identical to A? Circle one:                      B   C   D   E   F
- ii) Which structure is the enantiomer of A? Circle one:                      B   C   D   E   F
- iii) Which structure(s) is/are a diastereomer of A? Circle one or more:   B   C   D   E   F
- iv) Which structure is a structural isomer of A? Circle one:                      B   C   D   E   F
- v) Which structure is (2R,3S)-2,3-dibromobutanoic acid? Circle one:   B   C   D   E   F

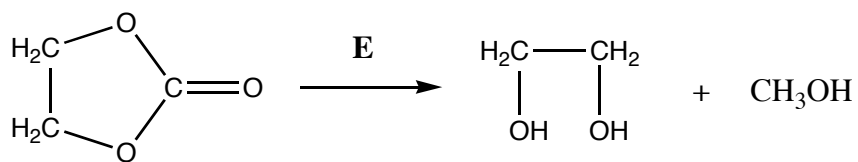
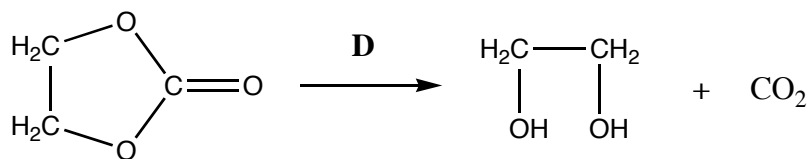
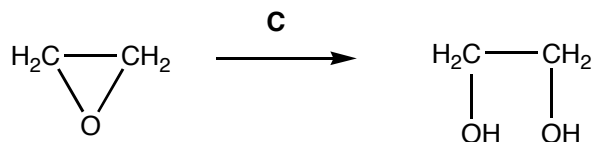
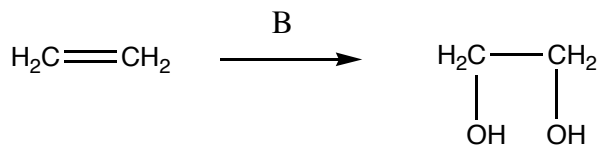
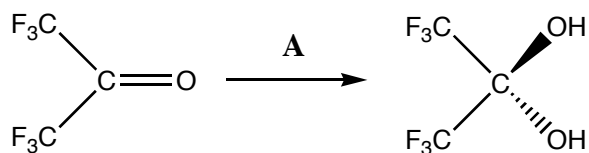
5. For questions X to X, you may choose more than one answer.

a. Which of the following reactions are formal reduction reactions?

A    B    C    D    E    None (F)

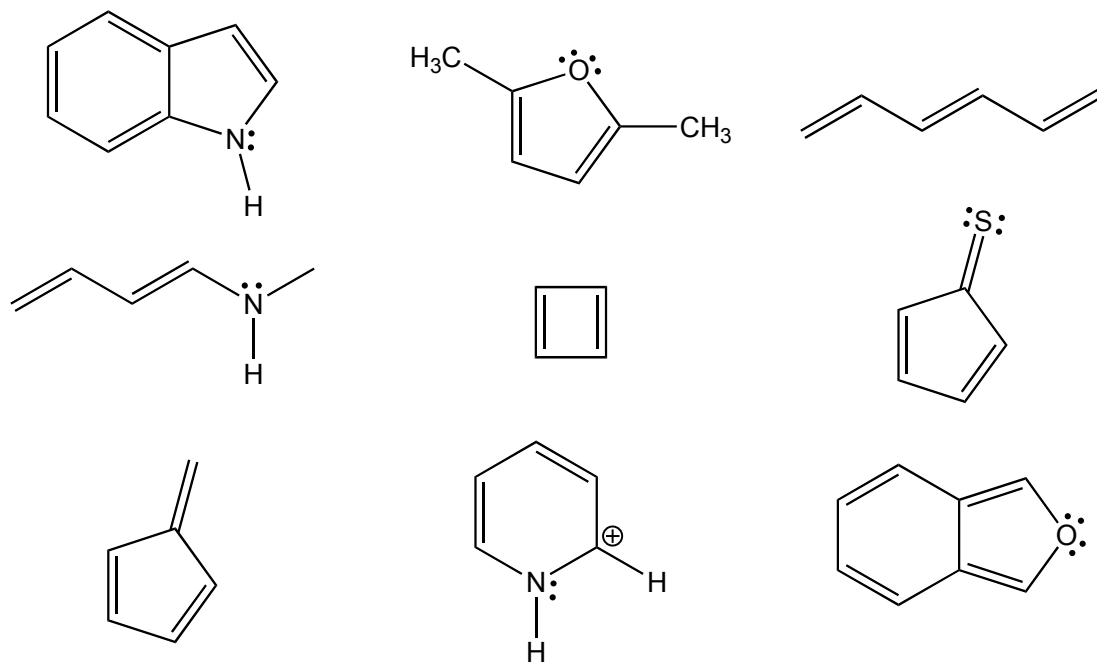
b. Which of the following reactions are formal oxidation reactions?

A    B    C    D    E    None (F)



## Part 2 Written

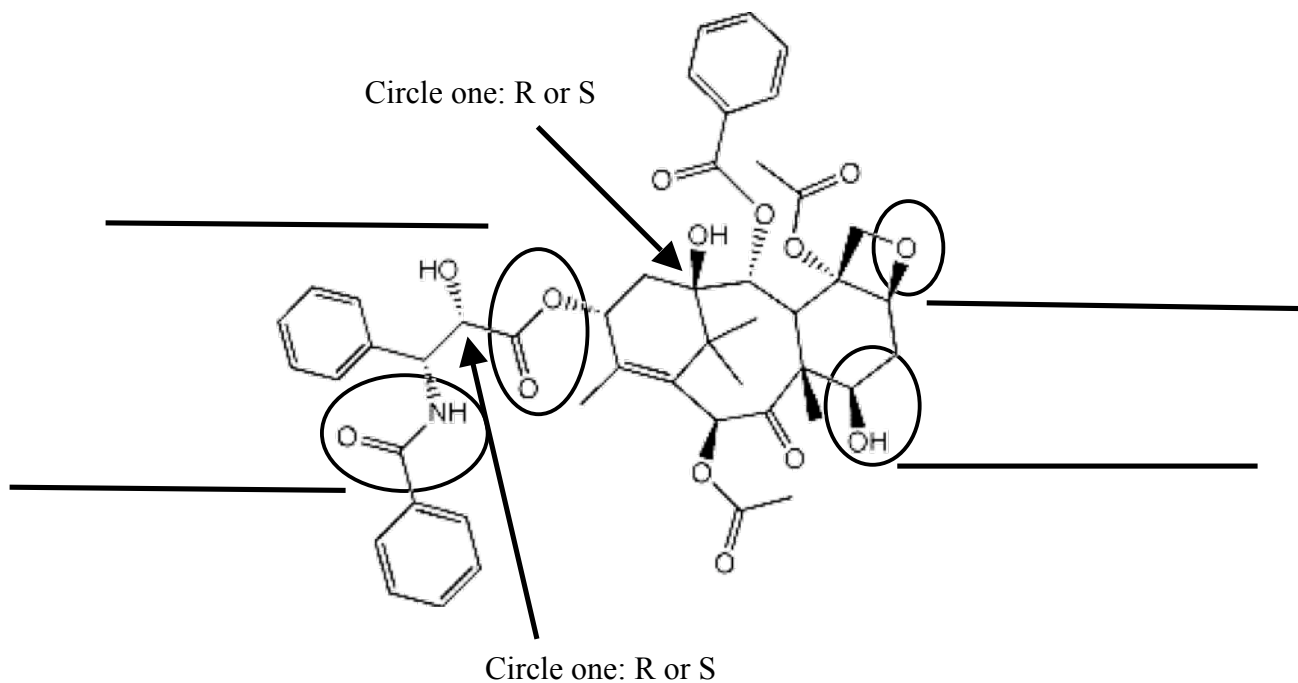
1. Circle the chemical species that are aromatic.



2. The C-O bond in the compound on the right is much longer than the C-O bond in the compound on the left. Explain this difference with a few sentences and by drawing some resonance forms.

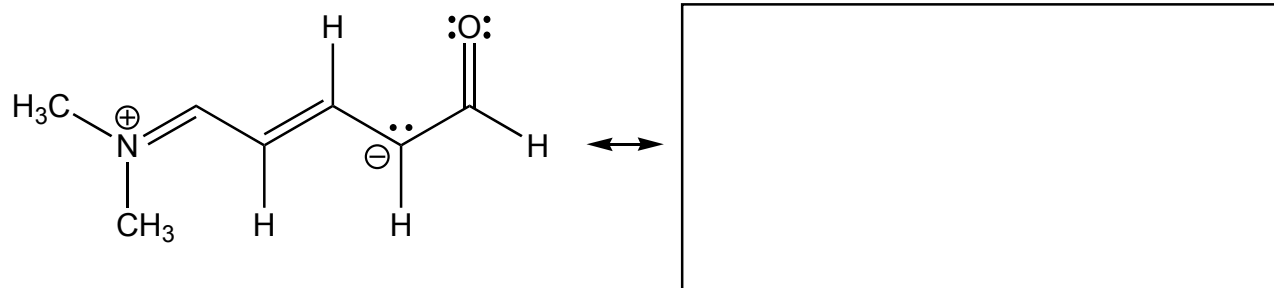


3. This is the structure of Taxol, a chemotherapy drug naturally synthesized by the yew tree. Write the name of each circled functional groups on the line beside it.

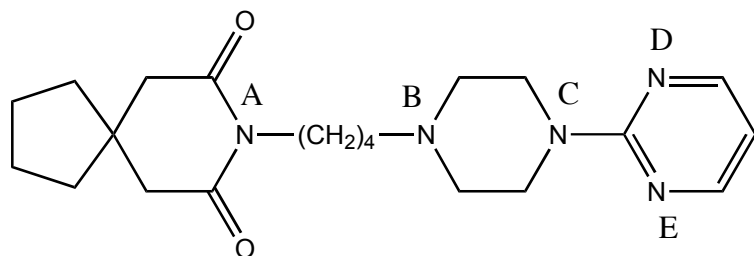


- Circle the absolute configuration of the two indicated chiral centres.
- Circle the ketone functional group.
- There is only one unconjugated alkene in Taxol. What is its configuration? Circle one: E Z

4. Draw the SINGLE most **contributing** resonance structure of the following chemical structure in the space below. Include all lone pairs of electrons and formal charges.



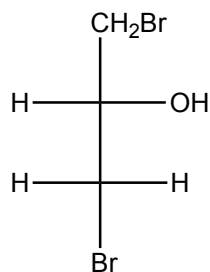
5. Shown below is the structure of buspirone, which is sold under several trade names. It is prescribed to reduce anxiety.



- Select the most basic nitrogen atom in buspirone.
- Select one other nitrogen atom in buspirone and explain why it is less basic than your choice in part i.

6. Provide the name for compound i) and draw compound ii) in the spaces provided.

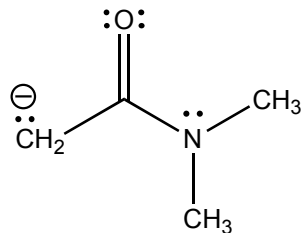
i)




ii)

(R)-5-chloro-3-heptanone

7. Draw all **contributing** resonance structures of the following molecular ion. Include lone pairs of electrons and formal charges.



8. After painting, you have plenty of green latex (an organic polymer) paint on your hands. But you've got a hot date later! What to do? In the bathroom at home you have some of your mother's fingernail polish remover (2-propanone), or water from the sink. What should you use to wash your hands, and why?

9. For each reaction below, complete the sentence by indicating which direction (right/left) the equilibrium lies and BRIEFLY explain your choice in the space provided. Note: listing pKa values does not constitute an explanation.

