



CHM1321: Organic Chemistry I

Final Exam-AID

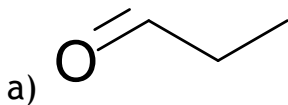
Review Package

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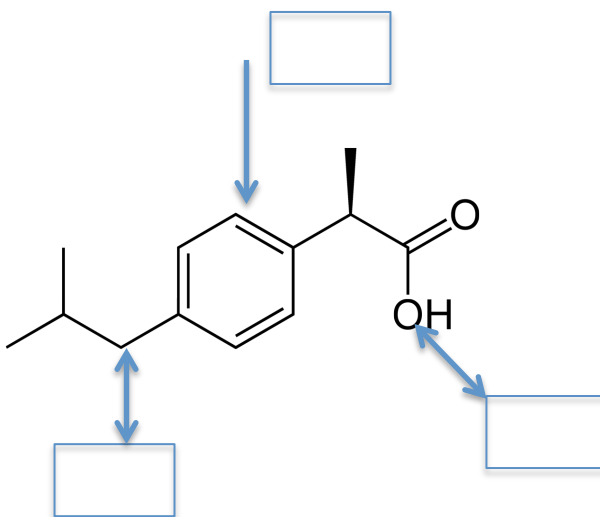
1. Define the term electronegativity. What is the general trend of electronegativity across the periodic table?

2. Draw the following molecule using LCAO notation. Be sure to label all orbitals and bonds.

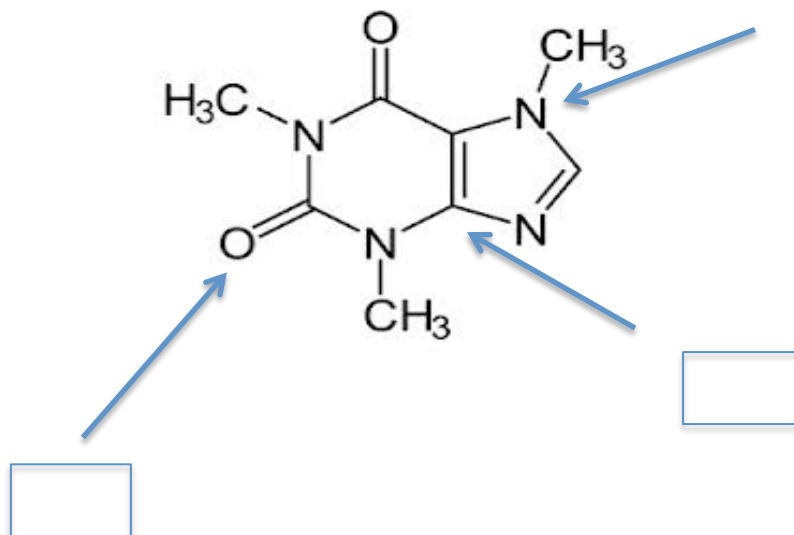


3. Provide the Hybridization state: sp_3 , sp_2 or sp , for each indicated atom of the following molecules.

a) Ibuprofen

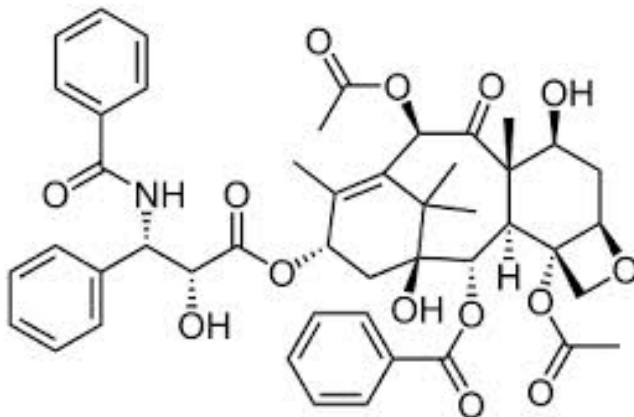


b) caffeine, shown below.



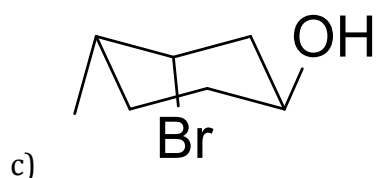
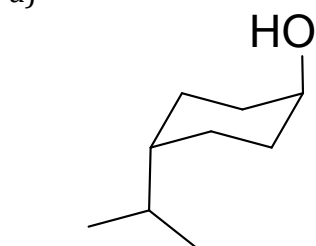
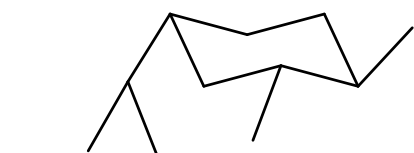
4. Define the term chirality.

5. Identify all of the chiral centers in the molecule below (HINT: there should be 11).

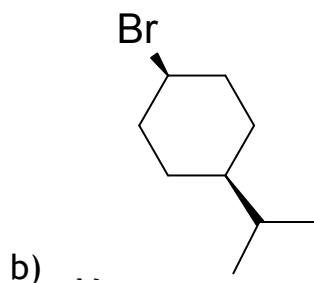
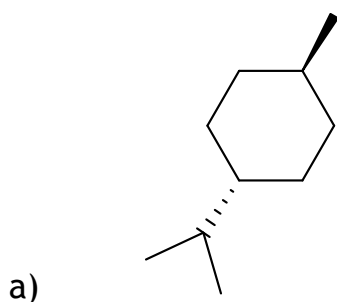


6. Define ring strain? What is the most stable conformation for a cyclohexane?

7. Draw the following chairs as a line structure in 2D. Be sure to include the appropriate stereochemistry.



8. (i) Draw the 2 chair configurations for the molecules below.
 (ii) For each structure, label the constituent as either axial or equatorial.
 (iii) Determine the most stable of the two configurations and justify your choice



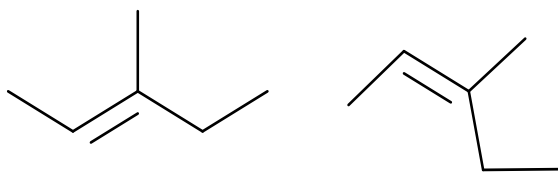
9. (a) Draw all the chair conformers and one boat for cyclohexanol using line structures (assume OH points up).

(b) Draw the Newman projections along the C1-C2 bond for each of the conformations.

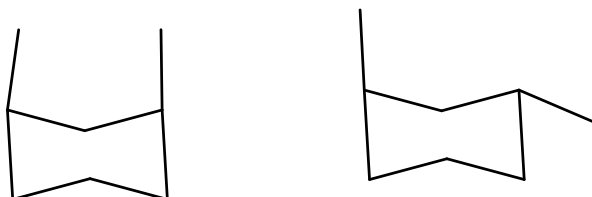
10. Define the follow terms: stereoisomer, enantiomer, diastereomer.

11. Determine whether the following pairs are constitutional isomers, stereoisomers or conformers.

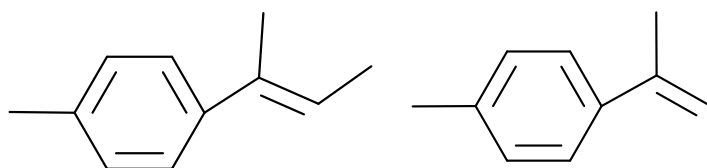
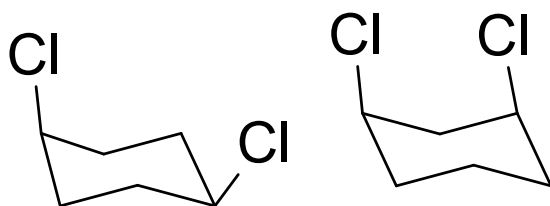
a)



b)



c)

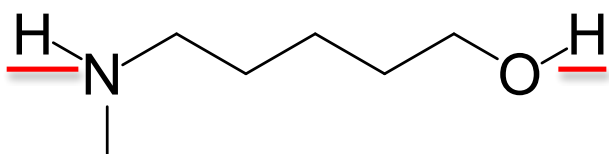


d)

12. For the following (i) draw the mechanism and products for the reaction, (ii) indicate if the reaction will favor reactants or products and justify your answer.

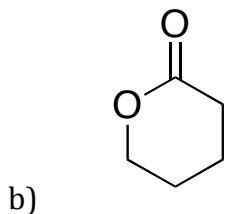
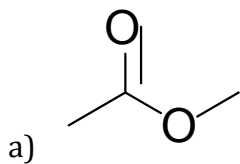


13. Which hydrogen is more acidic? Why?



14. For each molecule below:

- Draw the resonance structure using arrow notation to show movement of electrons
- Rank the resonance structures
- Justify your ranking
- Draw the resonance hybrid



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15. State Markovnikov's rule. Provide an example of a markovnikov and anti-markovnikov products.

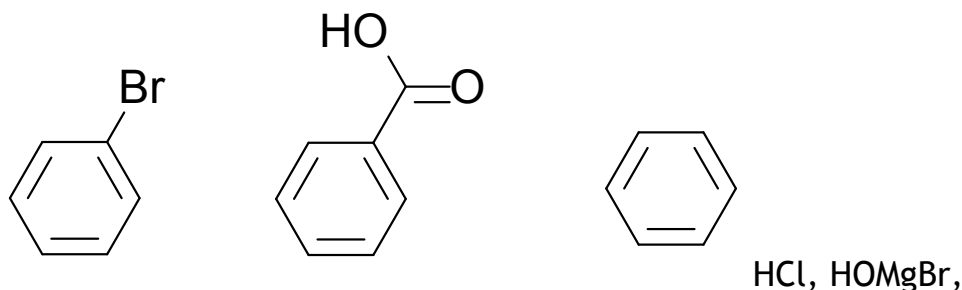
16. How is an epoxide formed? Give two mechanisms to open an epoxide.

17. When 1,3-butadiene reacts with HBr, a mixture of 3-bromo-1-butene and 1-bromo-2-butene is obtained. Give a mechanism to explain this result.

18. Carbonyls can be made by oxidation. Name the starting material and two types of reagents used in the reaction.

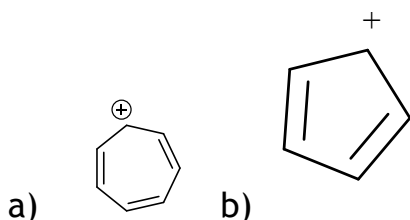
19. Carbonyls can also be reduced to an alcohol. Give the reagents and draw the mechanism using acetone.

20. You have the following reaction mixture. Propose a method to isolate benzoic acid.

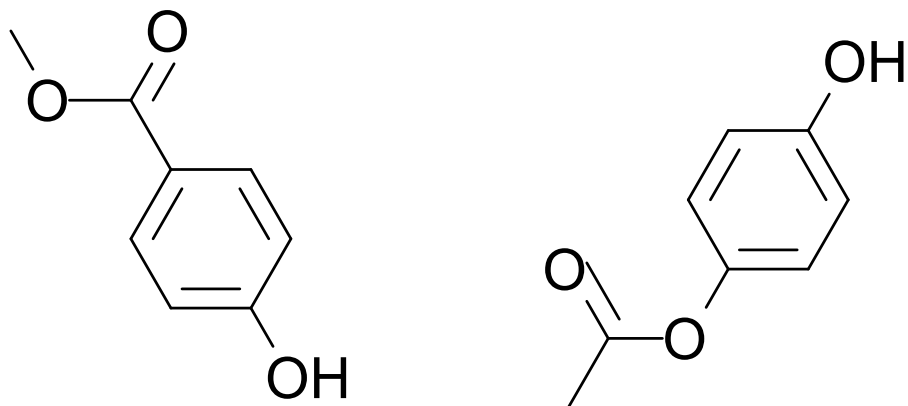


21. What are the three criteria for aromaticity?

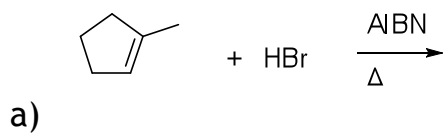
22. Indicate whether the following ions are aromatic, anti-aromatic or non-aromatic. Justify your choice.



23. Circle the strongest acid of the pair. Clearly justify your answer and include key structures that support your answer.



24. Provide a mechanism for the following transformations.



a)



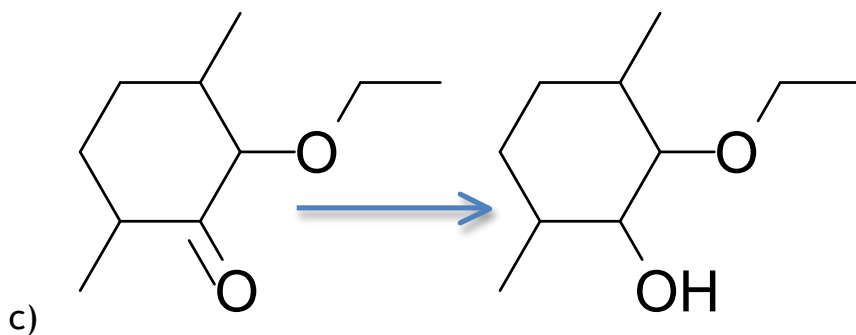
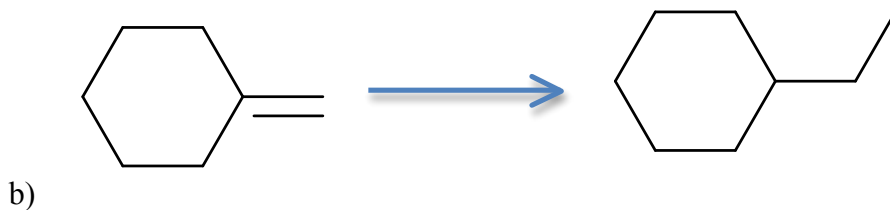
b)

25. Give the reagents required to obtain each of the products from the starting reagents provided.

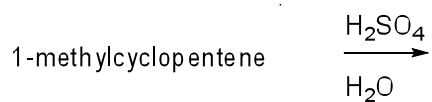
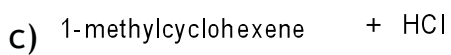
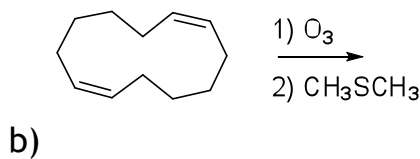
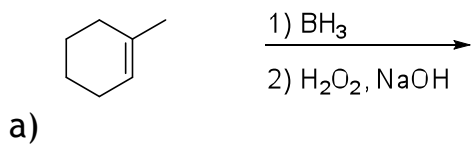


a)

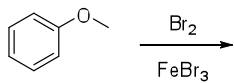
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26. Give the product of the following transformations;



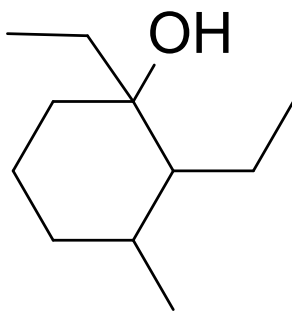
d)



e)

27. Propose a synthesis of the following product.

a) Acetylbenzene



b)

starting from

