5-31-2019

Organic Chemistry II Drill (CHEM2220D). Module 4. Sample Problems

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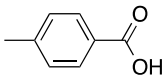
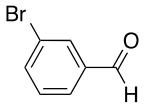
2220D – Drill test 4 – Sample problems

1. (5 points) Provide the IUPAC name for these compounds.





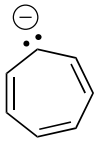
2. (4 points) Draw the structures of these compounds:

ortho-bromoaniline

meta-nitrotoluene

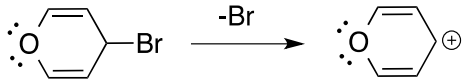
3. (4 points) Circle the molecule(s) that is/are aromatic.

4. (4 points) **a.** Draw the π-orbital energy diagram for this molecule. Show the ground state electronic configuration.



b. Is the ion aromatic? _____

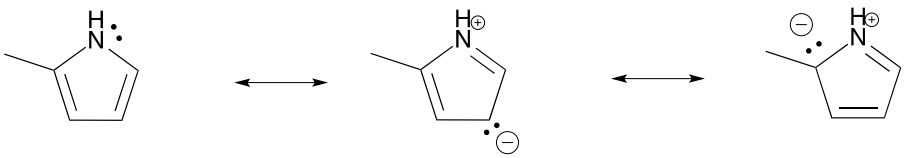
5. (4 points total) **a.** Identify the reactant and product as aromatic, non-aromatic, or antiaromatic.



_____ _____

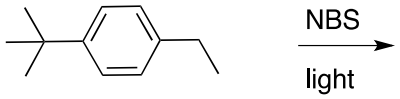
b. State whether the reaction is favorable, normal, or unfavorable and explain.

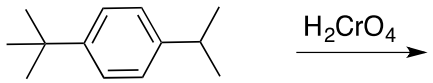
6. (4 points) Draw in the arrows that would show how electrons move to form the next resonance forms.

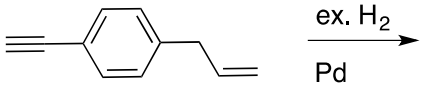


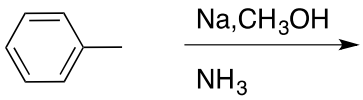
7. (6 points) Draw all arrows and the first 2 resonance forms.

8. (8 points) Predict the product(s) of these reactions, including stereochemistry where appropriate. If nothing occurs, write "no reaction".

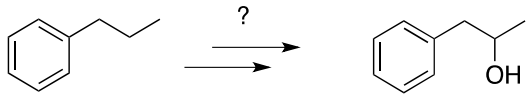


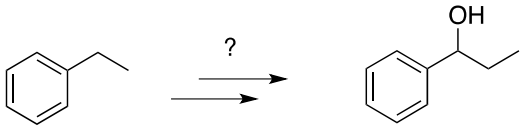




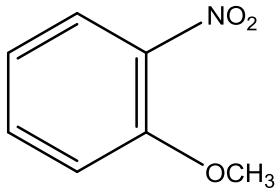


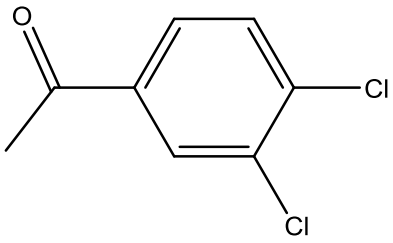
9. (11 points) Provide the correct reagents and intermediate structure(s) to complete the reaction schemes.





10. What is the IUPAC name of these compounds? (5 pts)

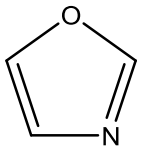


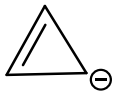


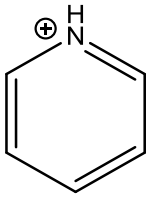
(a) _____ (b) _____

2. Draw: (3 pts)
m-ethylstyrene

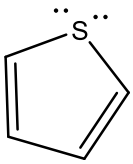
11. Circle the molecule(s) that is/are aromatic. Unshared pairs are **not** shown. For the molecule(s) that is/are not aromatic, explain why. (6 pts)







12. Draw the π orbital energy diagram for this molecule. Show the ground state electronic configuration. Is the molecule aromatic? Why? (6 pts)



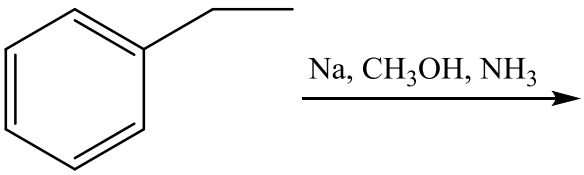
13. Complete these sentences for benzene: (6 pts)

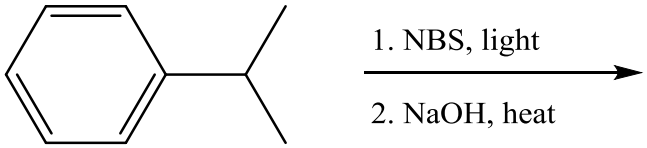
a. Benzene is more likely to undergo (addition substitution) reactions compared to alkenes.

b. The length(s) of the C-C bonds in benzene are _____compared to CH_2=CH_2.

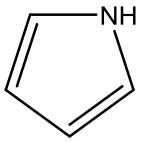
c. When reduced to cyclohexane, benzene releases (more less) energy than expected.

14. Complete these reactions. (8 pts)





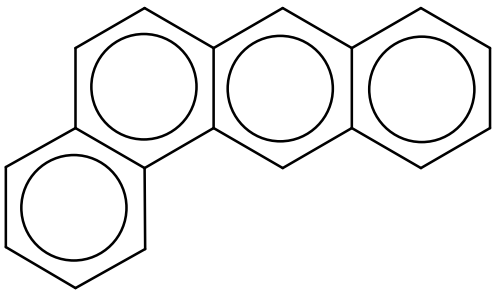
15. Pyrrole is a weak base. Draw an equation that shows this unfavorable reaction, and explain. Be sure to describe the reactant(s) and product(s) in terms of aromaticity, non-aromaticity, and/or antiaromaticity (6 pts).



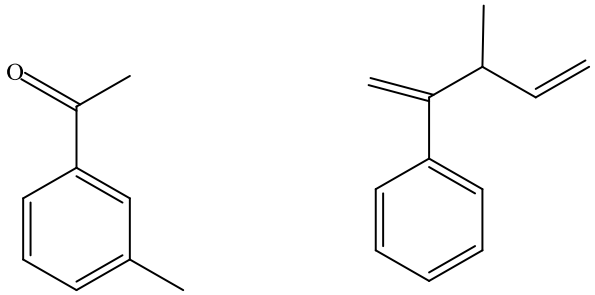
pyrrole

16. Propose a synthesis of benzaldehyde from ethylbenzene. (6 pts)

17. Draw a resonance structure having localized bonds for this molecule. How many pi electrons are present? (4 pts)



18. Name the following compound (6 points):

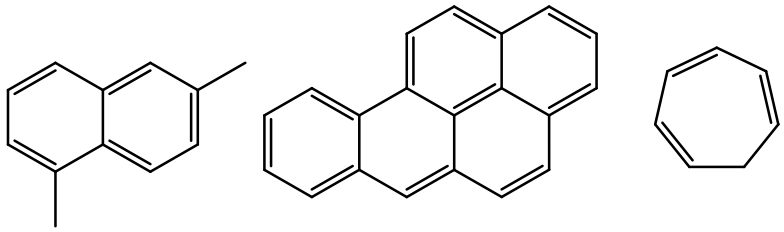


19. Draw structures of the following conpounds (6 points):

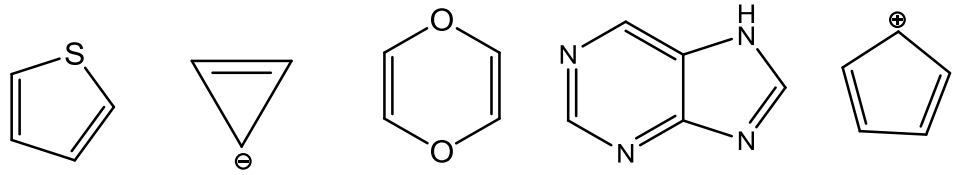
a) 2-chloro-4-ethylaniline

b) *p*-nitrobenzoic acid

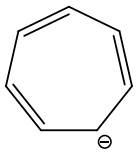
20. Which of the following compounds will react with Br_2 solution and decolorize it (4 points)?



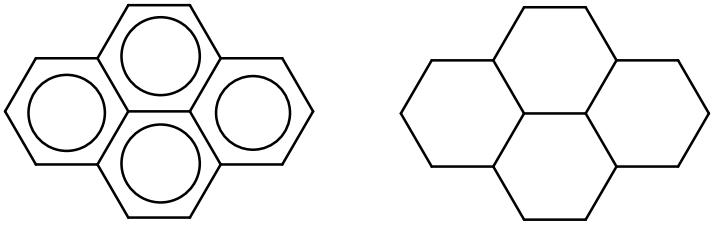
21. Circle **any** structure below that is aromatic (6 points).



22. Draw a π-orbital energy level diagram for this anion (4 points).

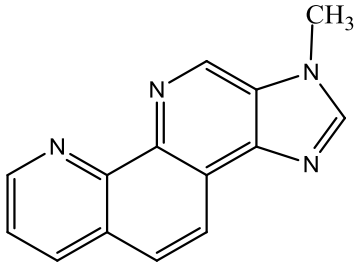


23. Draw a resonance structure of the following compound that would have localized bonds. How many π-electrons does this system have? (4 points):

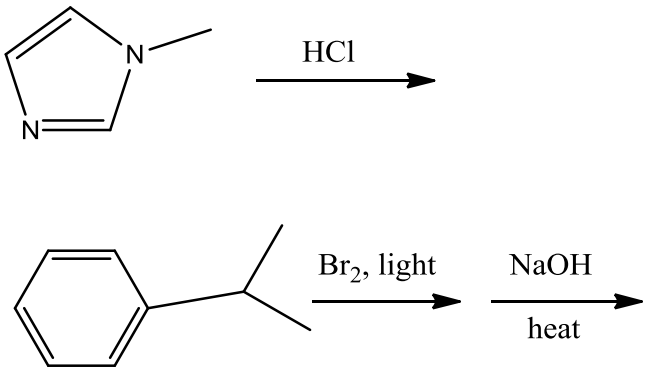


24. Which of the following compounds is **more acidic** and **why** (7 points). Support your answer with chemical structures/equations and/or use complete sentences for your explanation, which would not make me wonder what you actually meant.

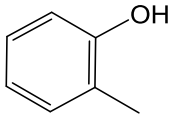
25. Which nitrogen atom in the following structure is the **least** nucleophilic (least basic) and **why** (5 points)?

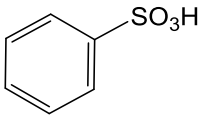


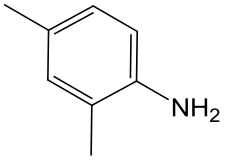
26. Predict product(s) of the following reactions (8 points):



27. Name these compounds: (9 pts)



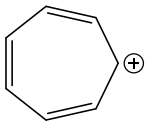


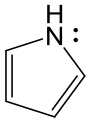


(a) _____ (b) _____ (c) _____

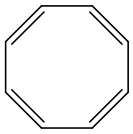
28. Draw the structures of these compounds: (9 pts)
(a) *ortho*-chlorobenzaldehyde (b) aniline (c) Benzylalcohol

29. Circle the molecule(s) that is/are aromatic. All unshared pairs are shown. (4 pts)

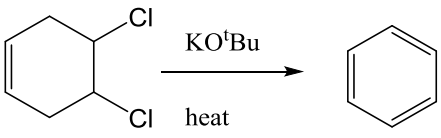




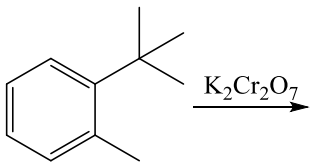
30. How many p electrons are present in the molecule and is it aromatic?
(4 pts)

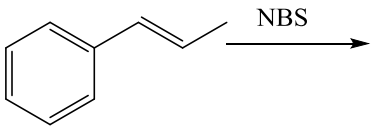


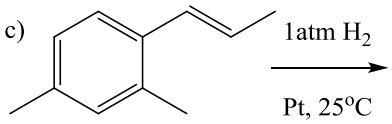
31. Identify the reactant and product as: aromatic, nonaromatic, or antiaromatic. Indicate if the reaction is especially favorable, normal, or especially unfavorable. (6 pts)



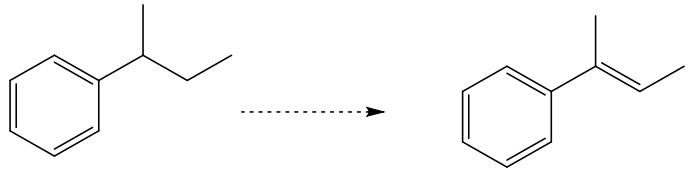
32. Predict the product of this reaction. (9 pts)

a) 

b) 

c) 

33. Propose a synthesis for the following transformation (6 pts)



34. Draw a resonance structure having localized bonds for this molecule. How many pi electrons are present? (5 pts)