

Name _____

Organic Chemistry II
CMH 2211
Sample Exam 1

I. Write structures for the compounds shown below:

_____ *meta*-bromophenol

_____ *o*-aminobenzoic acid

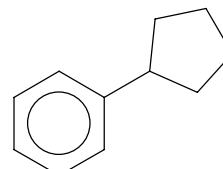
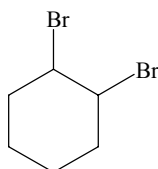
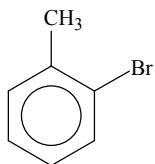
_____ phenanthrene

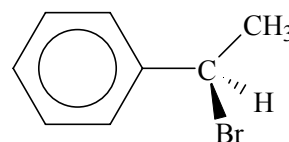
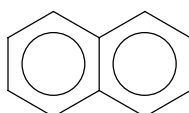
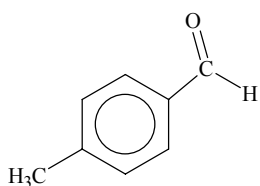
_____ 3-methyl-2-phenylhexane

_____ benzyl alcohol

_____ *para*-xylene

II. Name the compounds whose structures are shown below:





III. Fill in the Blank

1. In order for a compound to be aromatic it must satisfy certain rules. The compound or ion must be _____ and _____, have all atoms in the ring with _____ hybridization, and have _____ electrons in _____ orbitals.

2. Another name for 1,3 dibromobenzene is _____.

3. Benzene is more stable than you might expect based upon a 6 membered ring and three double bonds. This is because benzene has _____.

4. Is 26 a Huckle number? (Y/N) _____

5. Benzene ring deactivators have something in common. They all have _____.

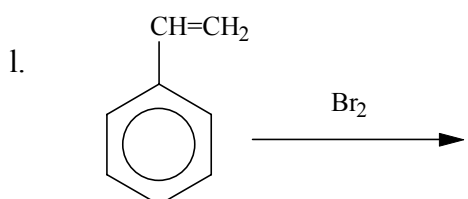
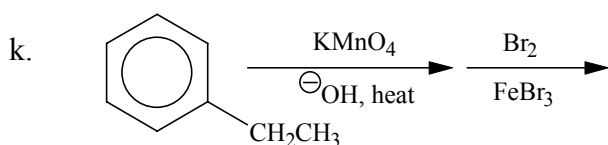
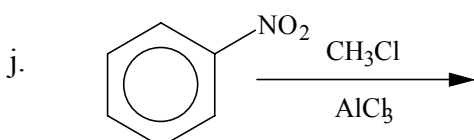
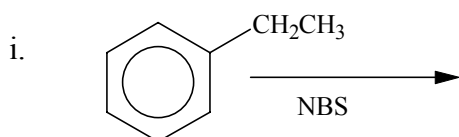
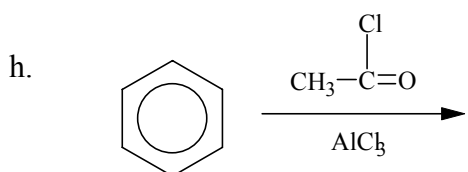
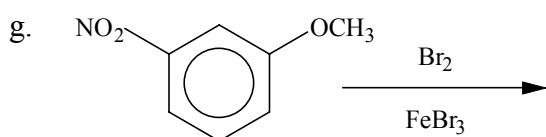
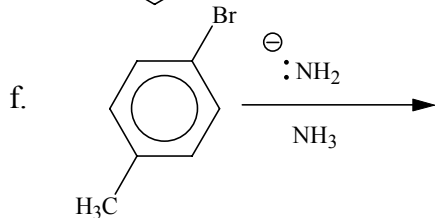
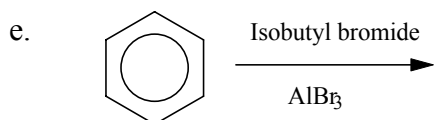
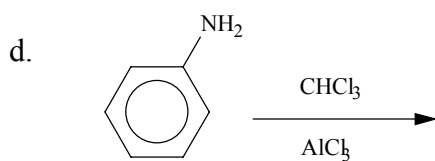
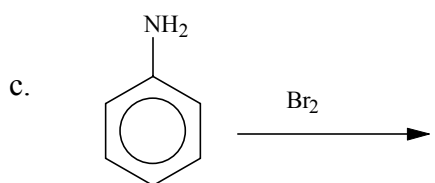
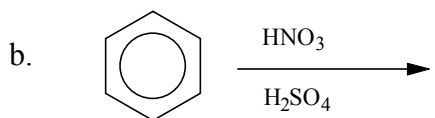
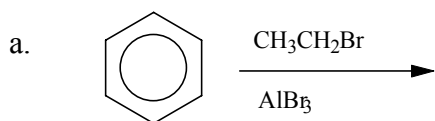
6. Proton NMR of aromatic compounds show characteristic absorptions in the range of _____ to _____ ppm.
7. Name two ring substituents that will prevent the ring from reacting in a Freidel-Craft reaction. _____ and _____
8. 4-Methylbenzioc acid would tend to add a third group at carbon number _____.
- V. Answer the questions below by YES or NO.
- a. Is cyclopentadienyl anion aromatic? _____
- b. Is cyclopentadienyl carbocation aromatic? _____
- c. Is cyclopentadiene aromatic? _____
- d. Is cycloheptatriene aromatic? _____
- e. Does cycloheptatriene have a Huckle # of electrons? _____

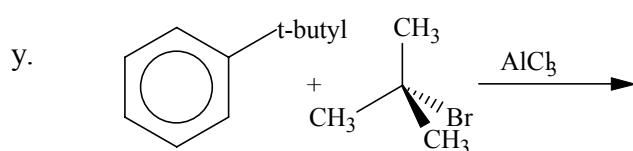
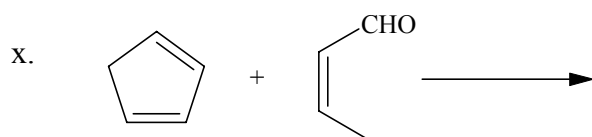
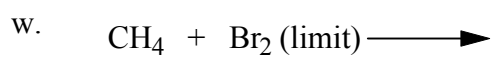
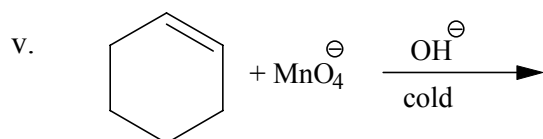
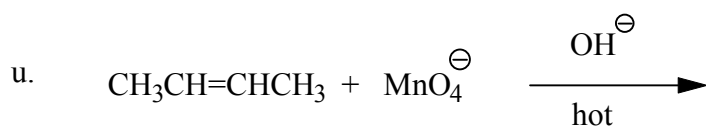
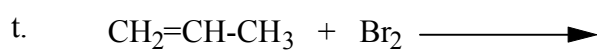
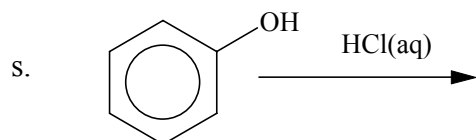
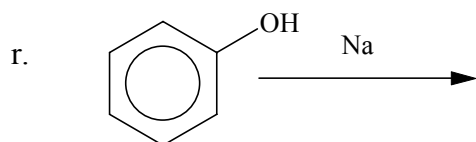
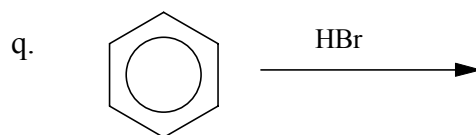
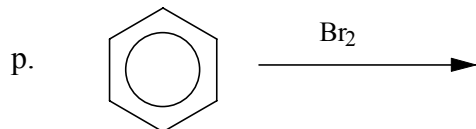
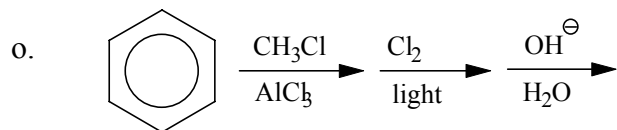
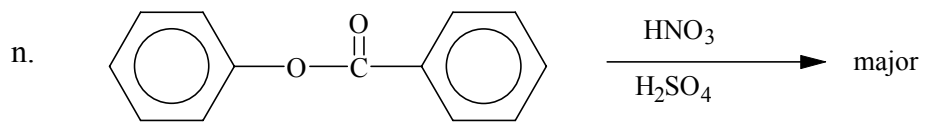
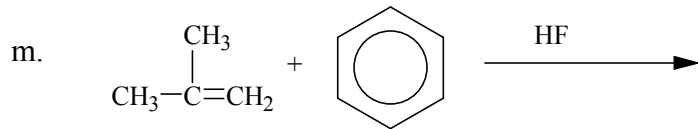
V. Answer the following:

Consider the reaction of anisole (methoxybenzene) with SO_3 in the presence of H_2SO_4

- a. Write the formula for the MAJOR product(s) of this reaction.
- b. What is the electrophile in this reaction?
- c. How can it be an electrophile if it has no full positive charge?
- d. Write a series of equations to show the mechanism of the above reaction. First show the mechanism when electrophilic attack is from the *para* position, and then show it from the *meta* position. Show all possible resonance forms of the arenium ion for both *para* and *meta* attack. Include the final step of conversion of the arenium ion to the product in your mechanism. USE KEKULE STRUCTURES.

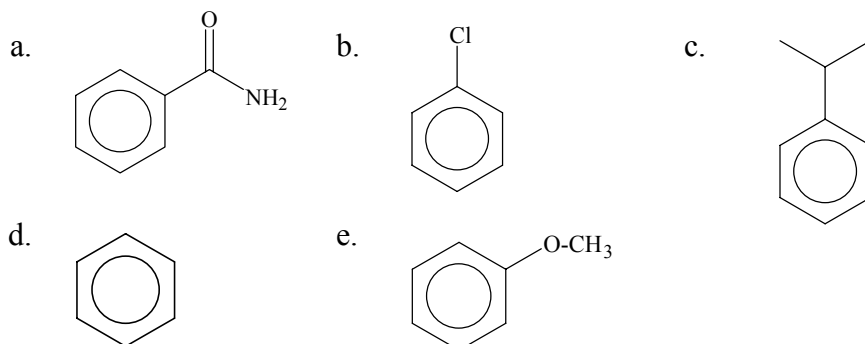
VI. Write structural formulas for the the products if a reaction occurs. If no reaction occurs write N.R.



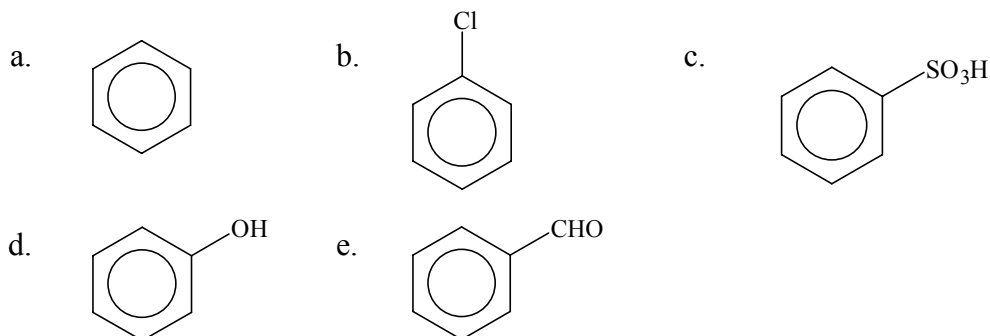


VII. Multiple Choice

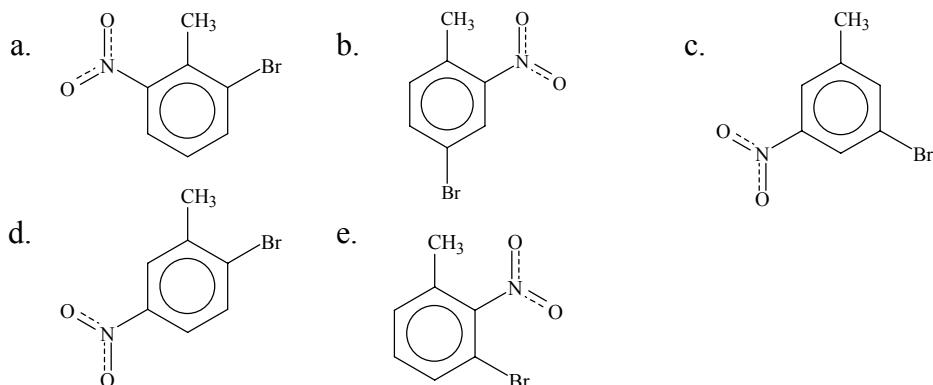
___ 1. Which of these gives mostly the meta product when treated with Br_2 / Fe ?



___ 2. Which undergoes electrophilic substitution on the ring most rapidly?



___ 3. In the reaction of 2-nitrotoluene with bromine in the presence of iron, which of the products shown below is the most abundant in the mixture?



___ 4. Which is characteristic for the proton NMR pattern of diethyl ether?

- a. An upfield singlet and a downfield doublet.
- b. An upfield triplet and a downfield quartet.
- c. An upfield singlet and a downfield triplet.
- d. Two upfield triplets on top of each other.
- e. One downfield singlet.

___ 5. Which of the following would be the most likely to undergo a nucleophilic aromatic substitution with hydroxide ion in normal conditions?

- a. Benzene
- b. Chlorobenzene
- c. Benzoic acid
- d. p-Chlorotoluene
- e. 2,4,6-Trinitro-1-chlorobenzene