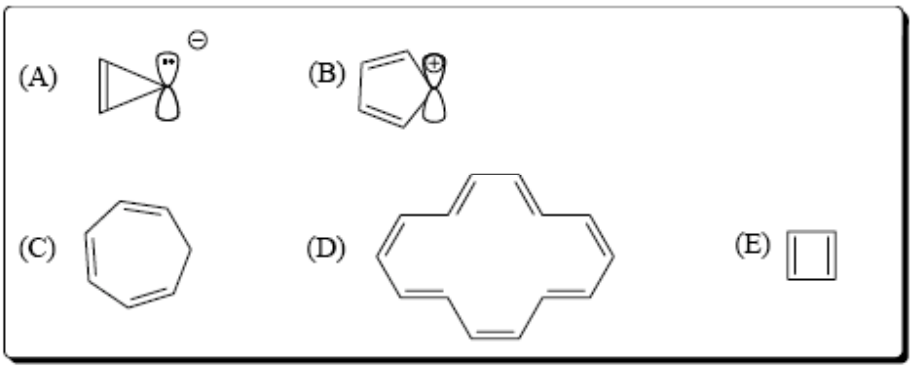
CH2400. 2006 Worksheet 2.

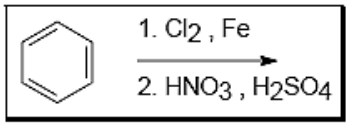
Directions. Please put answers 1-15 on a scantron. Be sure to fill in name and M-number. Questions 16-20 will be gone over in class.

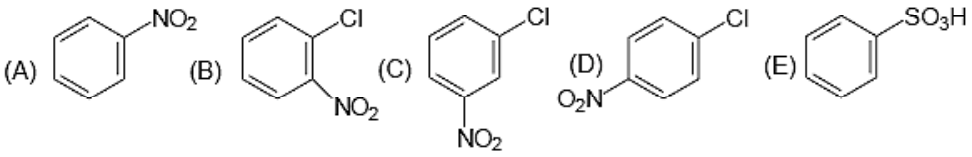
Scantron form is due at start of class on Monday, Dec. 4, 2006.

1. Which of the following is aromatic? (assume all are planar)



2. What is the major product of the reaction shown below?





3. In aromatic electrophilic substitution, the OCH_3 group is a(n) _____ director, and a(n) _____(fill in the blank).

(A) *o, p-* , deactivating
(B) *o, p-* , activating
(C) *m-*, deactivating
(D) *m-*, activating
(E) The OCH_3 group elicits the same reactivity as a H substituent and does not cause any directing effect.

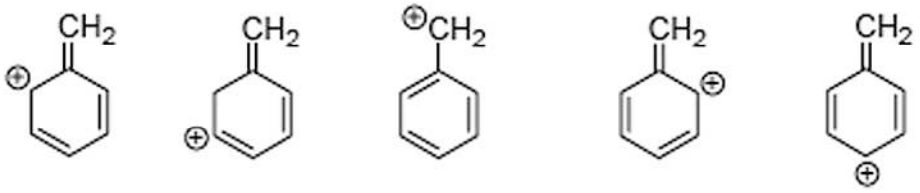
4. Which of the following is true about the aromatic electrophilic substitution of chlorobenzene by HNO_3/H_2SO_4?

(A) The chloro- substituent directs the incoming electrophile to the *o*- and *p*- positions selectively
(B) The chloro- substituent directs the incoming electrophile to the *m*- position selectively
(C) The incoming electrophile in nitration prefers the *m*- position regardless of substituent
(D) The incoming electrophile in nitration prefers the *o*-/*p*- positions regardless of the substituent
(E) The molecule is too deactivated to react

5. Phenol is a stronger acid than cyclohexanol because….

(A) The anion of phenol is stabilized by charge delocalization
(B) The cyclohexoxide anion is stabilized by the inductive effect
(C) Prior to ionization phenol is stabilized by resonance
(D) The benzene ring is flat so there is less steric hindrance to removal of the proton from phenol
(E) The original statement is incorrect, cyclohexanol and phenol are of nearly equal acidity

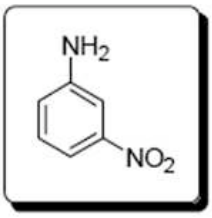
6. Which of the following does not contribute to the stabilization of the benzyl cation?



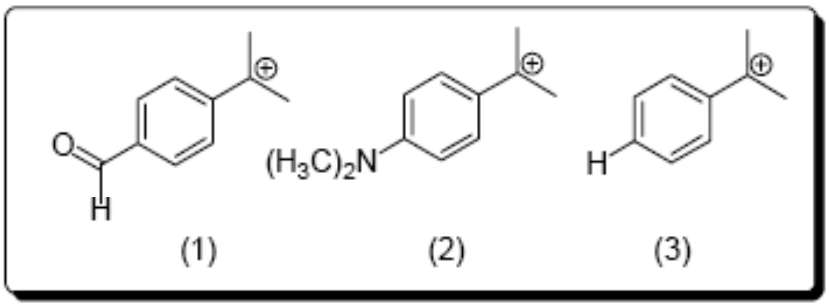
(A) (B) (C) (D) (E)

7. What is the name of the compound shown?

(A) *m*-nitrobenzoic acid (B) *m*-nitrophenol
(C) 3-nitroaniline
(D) *m*-nitrobenzaldehyde (E) none of these



8. Rank the following carbocations in order (from most to least stable).

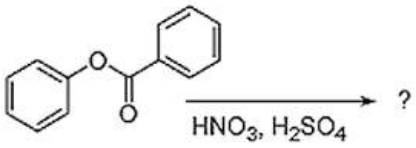


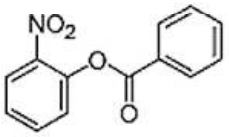
(A) 1>2>3 (B) 1>3>2 (C) 2>3>1 (D) 3>1>2 (E) 3>2>1

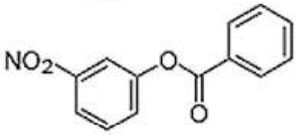
9. The ***major*** product of the reaction of 2-phenyl-1-propene with HBr would be:

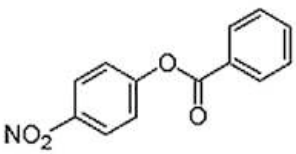
(A) 2-(*p*-bromophenyl)-1-propene
(B) 2-(*o*-bromophenyl)-1-propene
(C) 1-bromo-2-phenylpropane
(D) 2-bromo-2-phenylpropane
(E) 3-bromo-2-phenylpropane

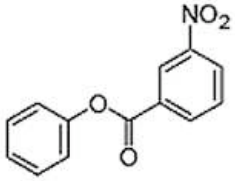
10. The ***major*** product of the reaction below is:

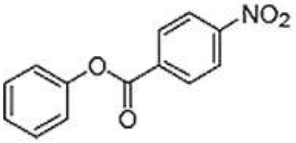


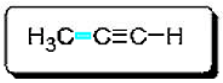
(A) 

(B) 

(C) 

(D) 

(E) 

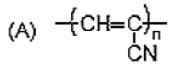
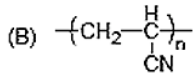
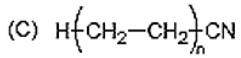
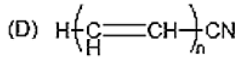
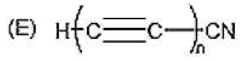
11. Describe the shaded sigma bond in propyne 

(A) sp^3-sp^3 (B) sp^3-sp^2 (C) sp^3-sp (D) sp^2-sp^2 (E) sp^2-sp

12. Which of the following reaction sequences would be the best to prepare *m*-bromoaniline from benzene?

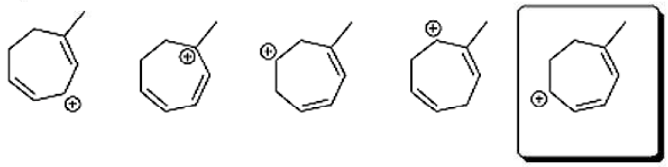
A. 1. Br_2, Fe 2. HNO_3, H_2SO_4 3. [H] (Fe, HCl)
B. 1. Br_2, Fe 2. NH_3, $AlCl_3$
C. 1. HNO_3, H_2SO_4 2. [H] (Fe, HCl) 3. Br_2, Fe
D. 1. HNO_3, H_2SO_4 2. Br_2, Fe 3. [H] (Fe, HCl)
E, Brominations require addition of $FeBr_3$ not Fe

13. Which of the following is poly(acrylonitrile)? acrylonitrile = "vinyl cyanide"

(A) 
(B) 
(C) 
(D) 
(E) 

14.

Before answering the next question, draw all of the resonance forms (contributing structures) for the carbocation shown in the box.



How many of the other structures shown are resonance forms of the carbocation in the box?

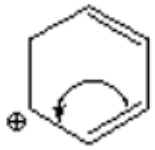
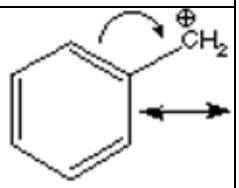
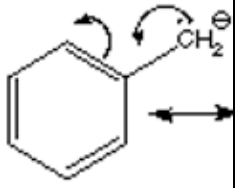
(A) none (B) 1 (C) 2 (D) 3 (E) 4 (all of them)

15.

In aromatic electrophilic substitution, the sulfonic acid group (SO_3H) is a(n) ____ director and a(n) ____ group. (Fill in the blanks).

(A *o, p-* , deactivating
(B) *o, p-* , activating
(C) *m-*, deactivating
(D) *m-*, activating
(E) The sulfonic acid group elicits the same reactivity as a H substituent and does not cause any directing effect.

Show all resonance forms for the following:

16.	
17.	
18.	
19.	
20.