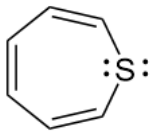
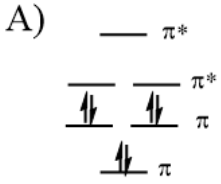
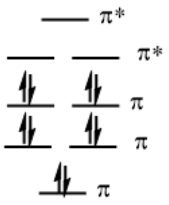
CHM 3150 Organic Chemistry II
Dr. Laurie S. Starkey, Cal Poly Pomona
Chapter 18, Aromatic Reactions (Ch 17/18 Part 2) – Practice Problems

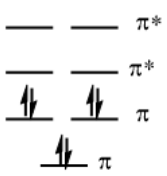
For clicker question voting, go to:
https://pollev.com/lauriestarke263

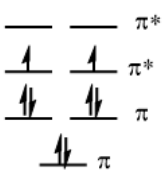
1 Which of the following represents the molecular orbital (MO) diagram for the compound shown?

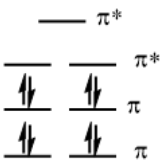


A)


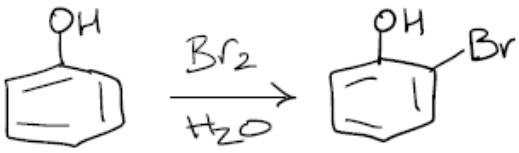
B)


C)


D)


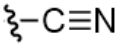
E)


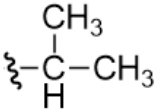
2 Provide a mechanism for the following reaction.

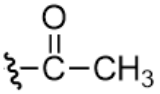


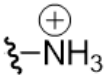
3 What effect on reactivity toward the Electrophilic Aromatic Substitution reaction would you expect if an **electron-withdrawing group** was placed on the aromatic ring?

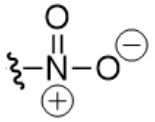
4 For the Electrophilic Aromatic Substitution reaction, which of the following does NOT act as an **electron-withdrawing group**?

A) 

B) 

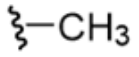
C) 

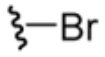
D) 

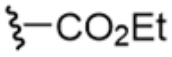
E) 

Categorize each of the following groups as an **ortho/para director** or a **meta director.**

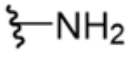
5

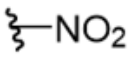


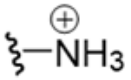


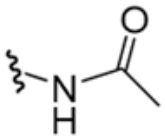


6

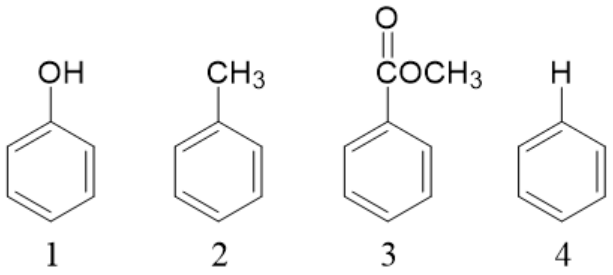








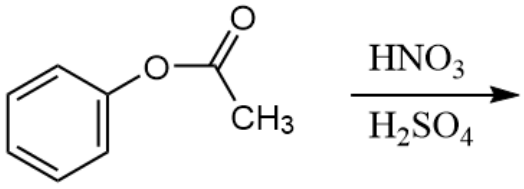
7



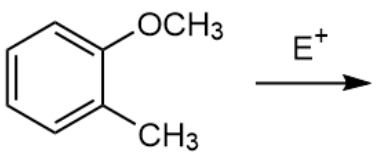
Arrange the molecules shown above in order of INCREASING reactivity toward electrophilic aromatic substitution, from least reactive to most reactive?

8

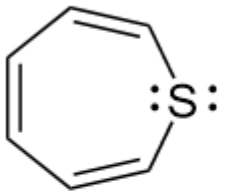
Predict the major product of the following nitration reaction and explain the regiochemistry.



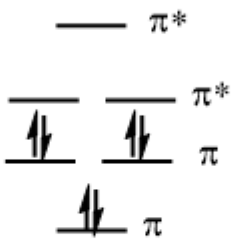
9



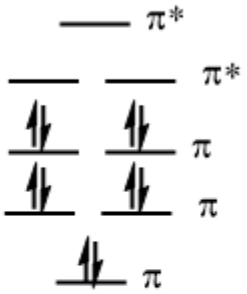
1 Which of the following represents the molecular orbital (MO) diagram for the compound shown?



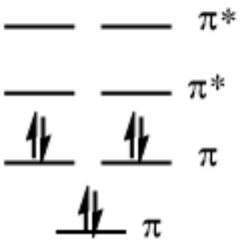
A)



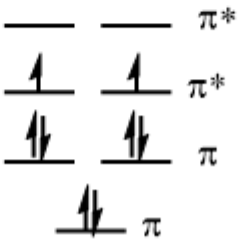
B)



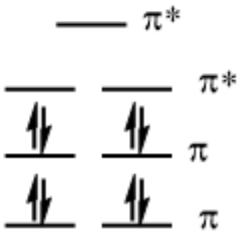
C)



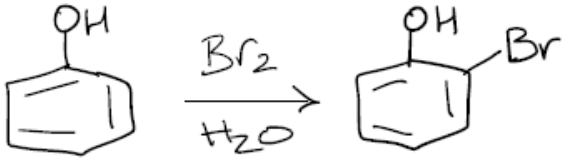
D)



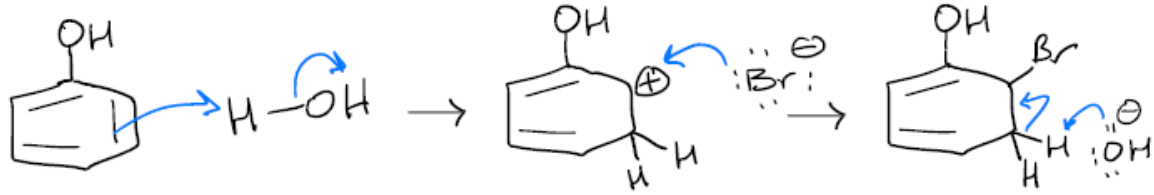
E)



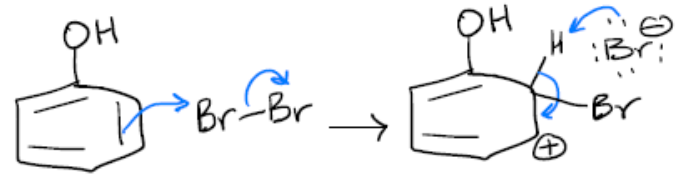
2 Provide a mechanism for the following reaction.



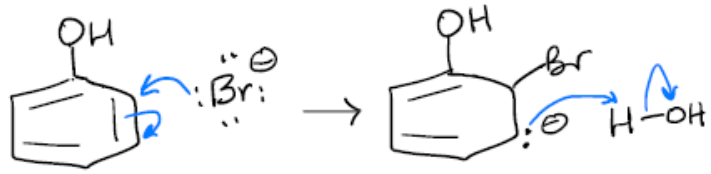
A



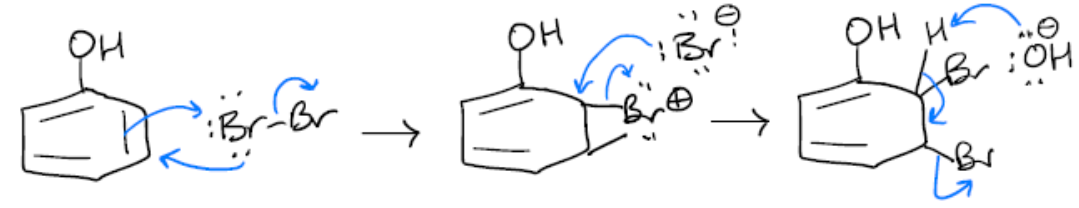
B



C



D



3 What effect on reactivity toward the Electrophilic Aromatic Substitution reaction would you expect if an **electron-withdrawing group** was placed on the aromatic ring?

A) I would expect the ring to be MORE reactive, because the ring is acting as a nucleophile.

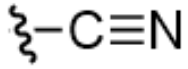
B) I would expect the ring to be LESS reactive, because the ring is acting as a nucleophile.

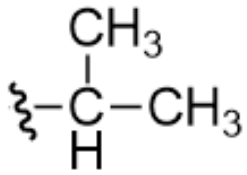
C) I would expect the ring to be MORE reactive, because the ring is acting as an electrophile.

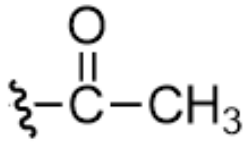
D) I would expect the ring to be LESS reactive, because the ring is acting as an electrophile.

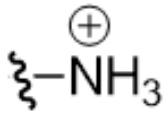
E) I would expect NO effect on the reactivity of the ring (steric hindrance is the most important factor).

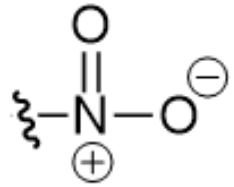
4 For the Electrophilic Aromatic Substitution reaction, which of the following does NOT act as an **electron-withdrawing group**?

A) 

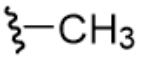
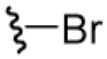
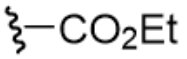
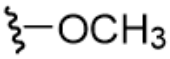
B) 

C) 

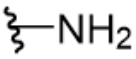
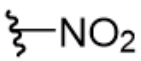
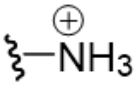
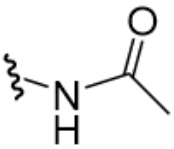
D) 

E) 

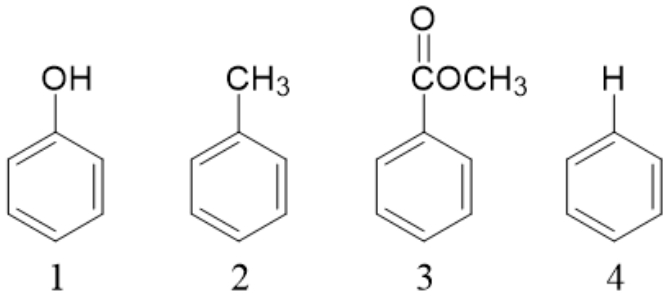
5 Categorize each of the following groups as an **ortho/para director** or a **meta director.**

				
A)	o/p	meta	o/p	meta
B)	o/p	o/p	meta	meta
C)	meta	meta	meta	o/p
D)	o/p	o/p	meta	o/p
E)	meta	meta	o/p	meta

6 Categorize each of the following groups as an **ortho/para director** or a **meta director.**

				
A)	o/p	meta	meta	o/p
B)	o/p	meta	meta	meta
C)	meta	o/p	meta	meta
D)	o/p	o/p	meta	o/p
E)	meta	meta	o/p	meta

7



In which of the following are the molecules shown above listed in order of INCREASING reactivity toward electrophilic aromatic substitution, from least reactive to most reactive?

A) 2 < 4 < 1 < 3

B) 3 < 2 < 4 < 1

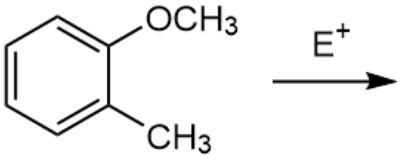
C) 3 < 4 < 2 < 1

D) 4 < 2 < 1 < 3

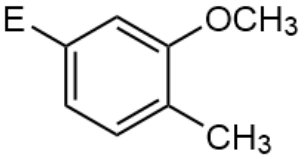
E) 4 < 3 < 1 < 2

9

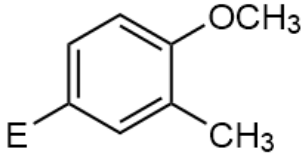
Predict the major product.



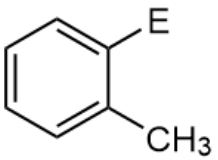
A)



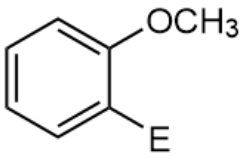
B)



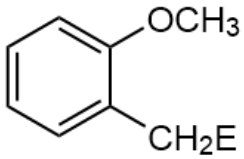
C)



D)

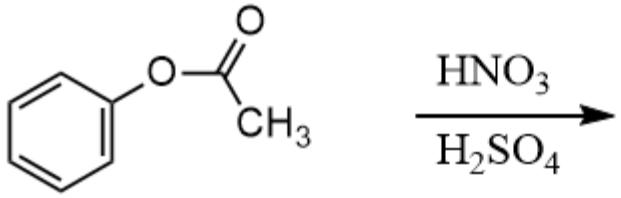


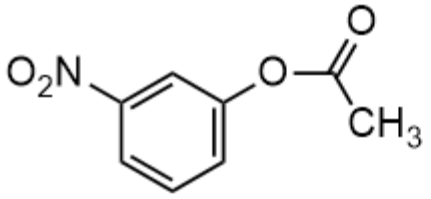
E)



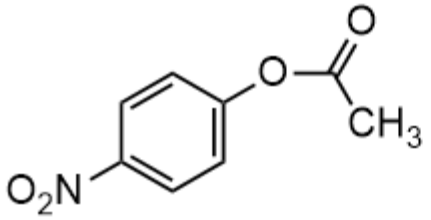
8

Predict the major product of the following nitration reaction and explain the regiochemistry.

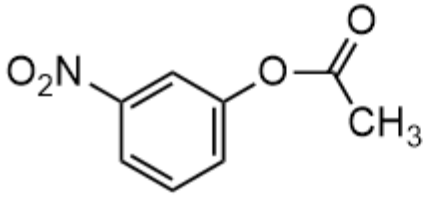


A) 

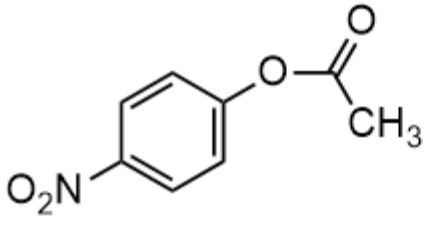
(because -NO_2 is a meta director)

B) 

(because -NO_2 is an ortho/para director)

C) 

(because -OAc is a meta director)

D) 

(because -OAc is an ortho/para director)