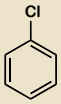
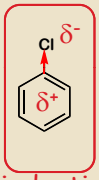
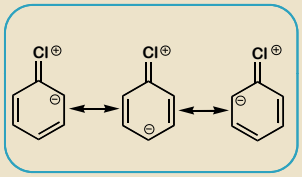


What about a halide? Does a Cl activate or deactivate the ring?



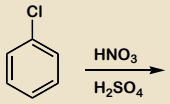
inductive effect



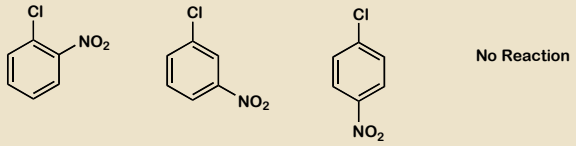
resonance effect

Cl poor at π bonding

Deactivates, but directs ortho-para

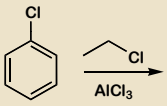


Predict the product

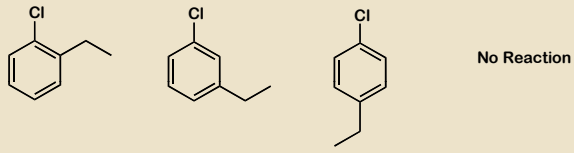


A B C D

No Reaction



Predict the product



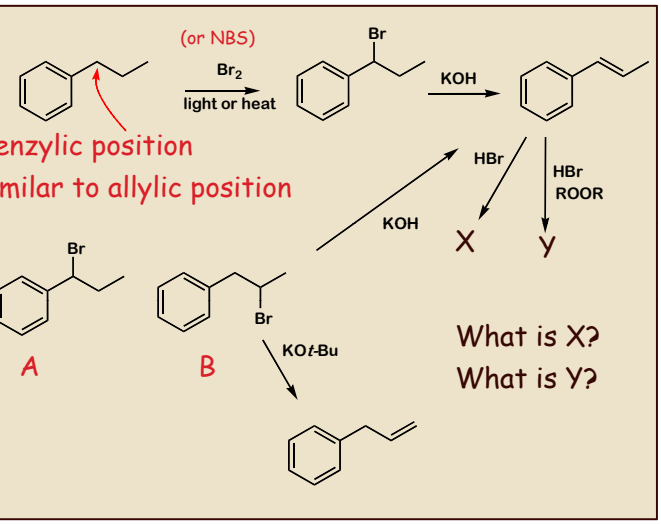
A B C D

No Reaction

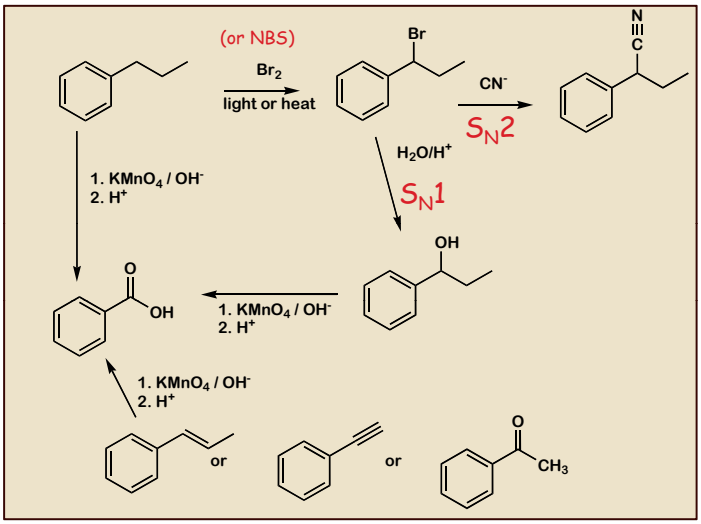
TABLE 15.2 Effect of Substituents on Electrophilic Aromatic Substitution

Ortho–Para Directors	Meta Directors
Strongly Activating	**Moderately Deactivating**
—$\ddot{N}H_2$, —$\ddot{N}HR$, —$\ddot{N}R_2$	—C≡N
—$\ddot{O}H$, —$\ddot{O}:^-$	—SO_3H
Moderately Activating	—CO_2H, —CO_2R
—$\ddot{N}HCOCH_3$, —$\ddot{N}HCOR$	—CHO, —COR
—$\ddot{O}CH_3$, —$\ddot{O}R$	**Strongly Deactivating**
Weakly Activating	—NO_2
—CH_3, —C_2H_5, —R	—NR_3^+
—C_6H_5	—CF_3, —CCl_3
Weakly Deactivating	
—$\ddot{F}:$, —$\ddot{C}l:$, —$\ddot{B}r:$, —$\ddot{I}:$	

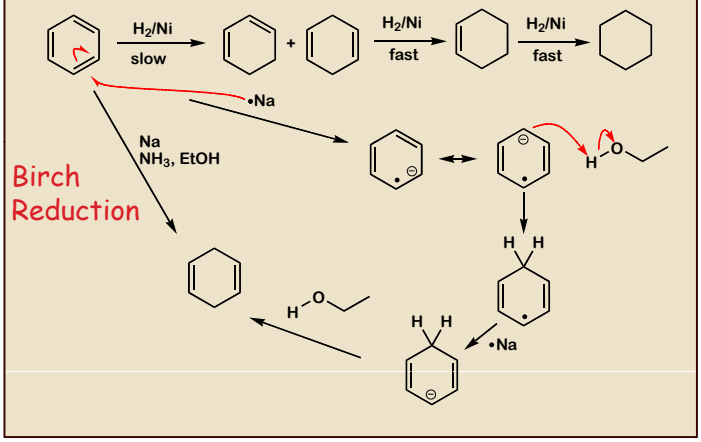
Friedel Crafts Difficult or impossible

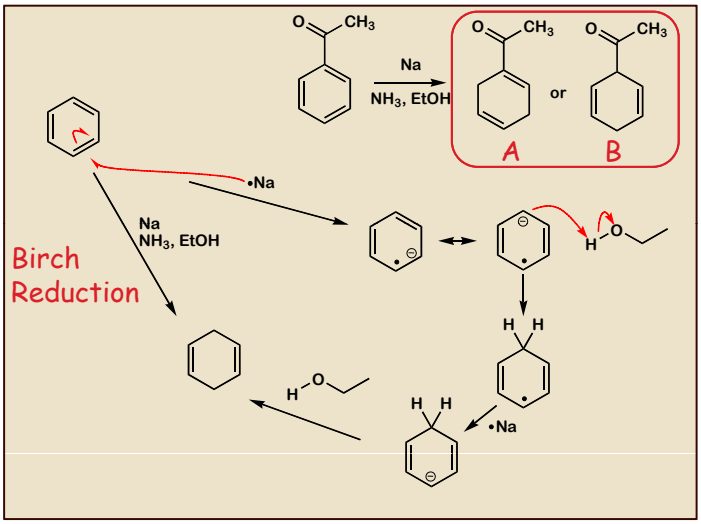


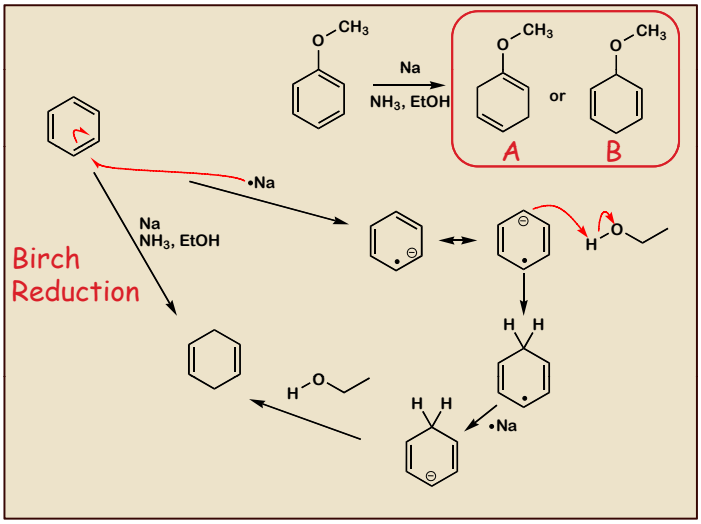
benzylic position
similar to allylic position

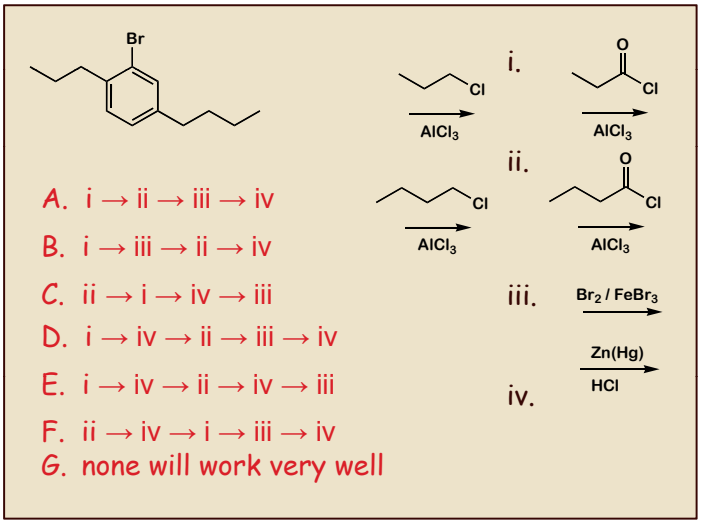


What about reduction?









A. i → ii → iii → iv

B. i → iii → ii → iv

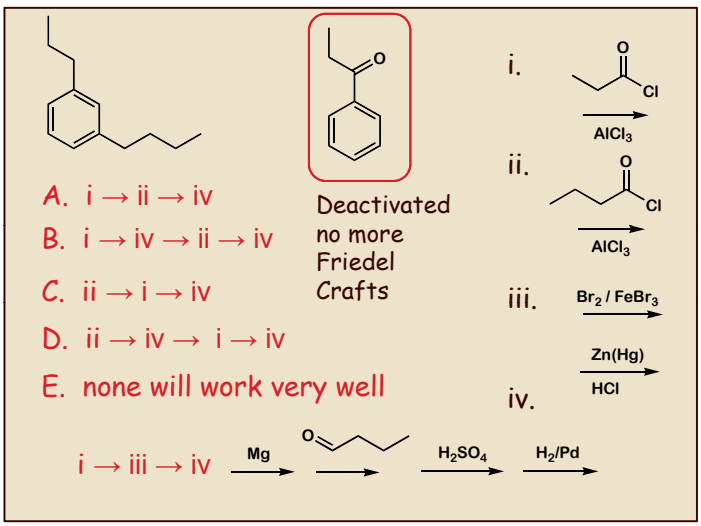
C. ii → i → iv → iii

D. i → iv → ii → iii → iv

E. i → iv → ii → iv → iii

F. ii → iv → i → iii → iv

G. none will work very well



A. i → ii → iv

B. i → iv → ii → iv

C. ii → i → iv

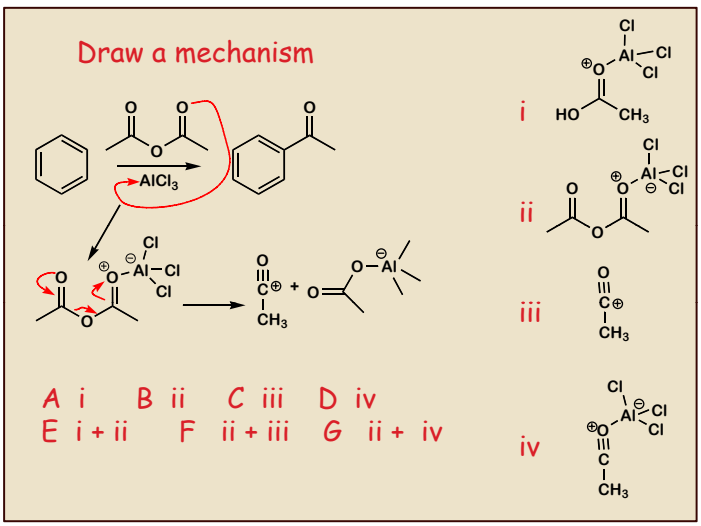
D. ii → iv → i → iv

E. none will work very well

Deactivated
no more
Friedel
Crafts

i → iii → iv

Draw a mechanism



A i B ii C iii D iv

E i + ii F ii + iii G ii + iv

Draw a mechanism