

AROMATICKÉ SLOUČENINY



Použitá literatura (spektra)

Vollhardt, Peter K and Neil E. Schore. Organic Chemistry Structure and Function. Ed. Clancy Marshall. New York: W.H. Freeman and Company, 2007.



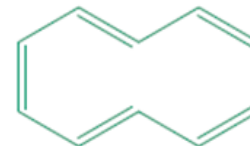
Cyclobutadiene:
planar, **antiaromatic**



Benzene:
planar, **aromatic**



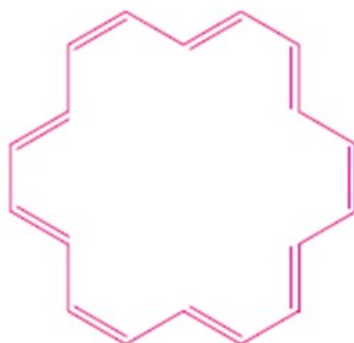
Cyclooctatetraene:
nonplanar = **nonaromatic**



[10]Annulene:
nonplanar = **nonaromatic**



[14]Annulene:
planar = **aromatic**



[18]Annulene:
planar = **aromatic**

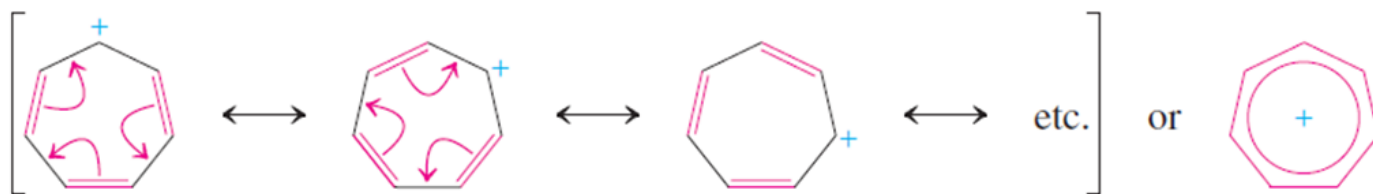


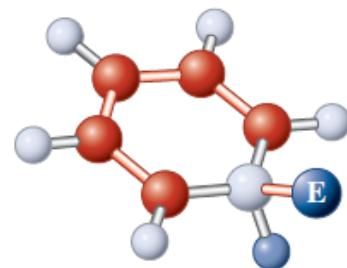
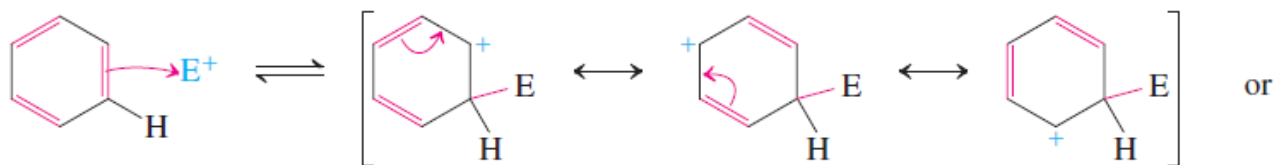
1,3-Cyclopentadiene:
noncyclically delocalized
= **nonaromatic**



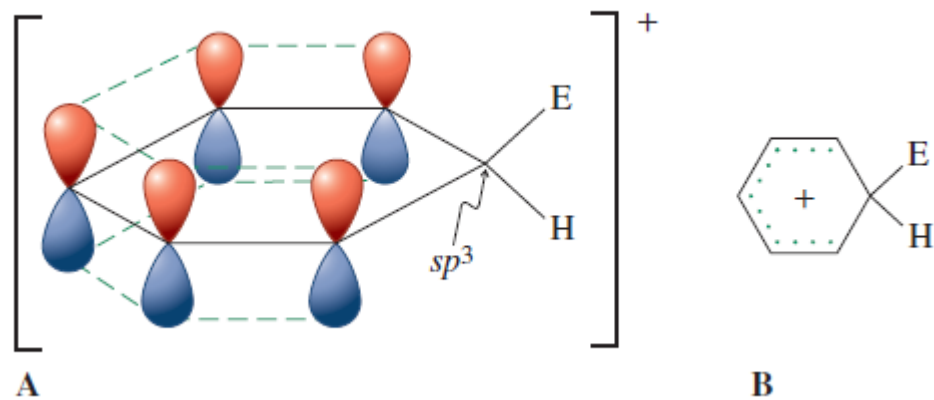
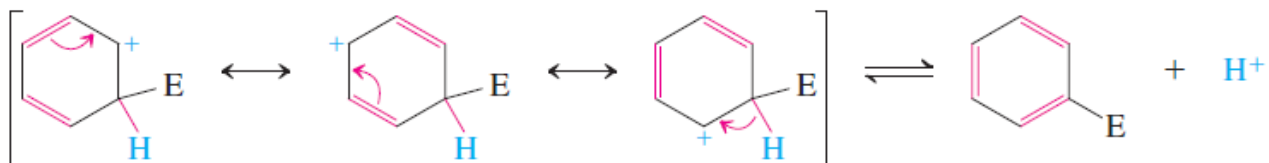
1,4-Cyclohexadiene:
nondelocalized
= **nonaromatic**

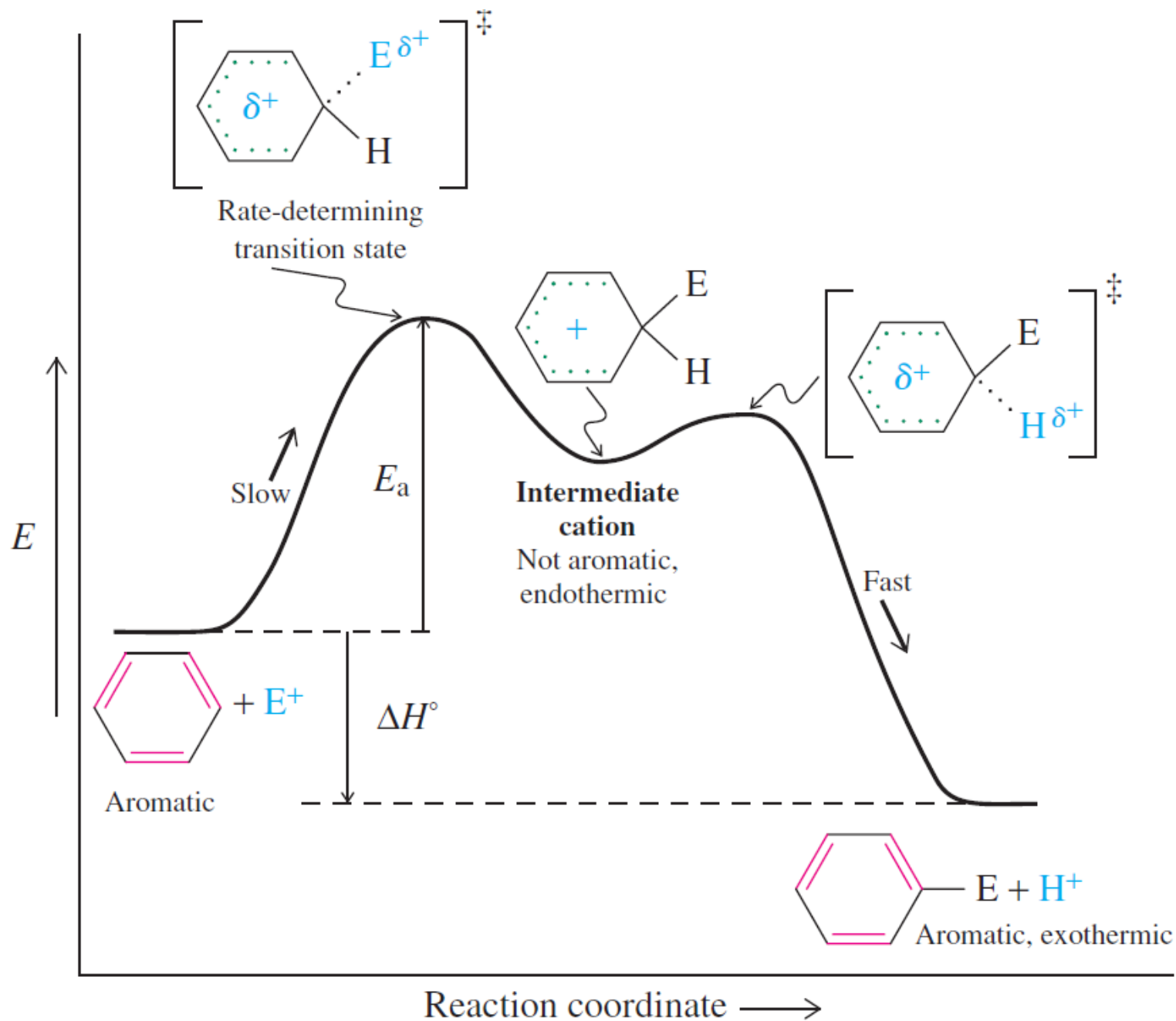






Step 2. Proton loss





ortho a para dirigující

silné a středně silně aktivující



slabě aktivující

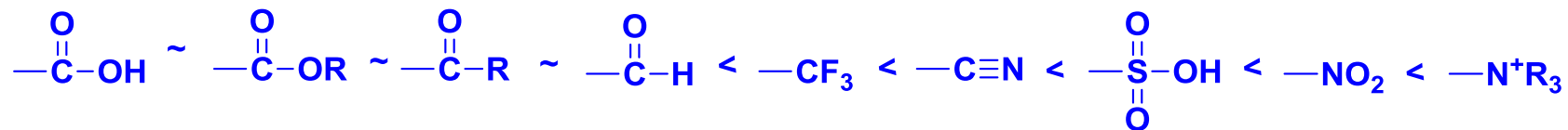
alkyl, fenylyl

slabě deaktivující



meta dirigující

silně deaktivující

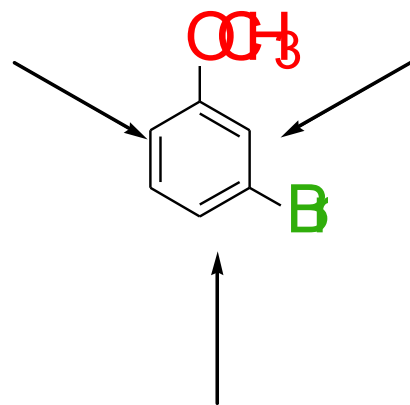
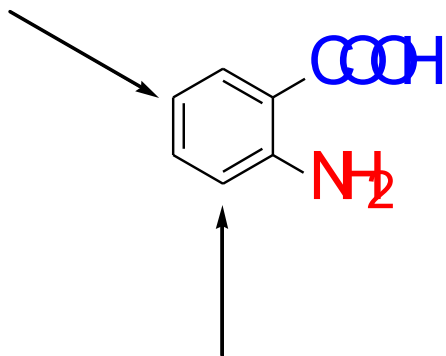
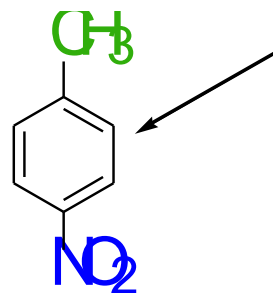
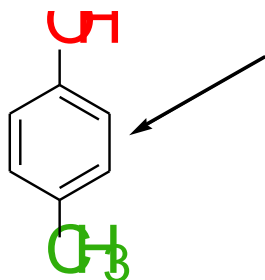


aktivní skupiny

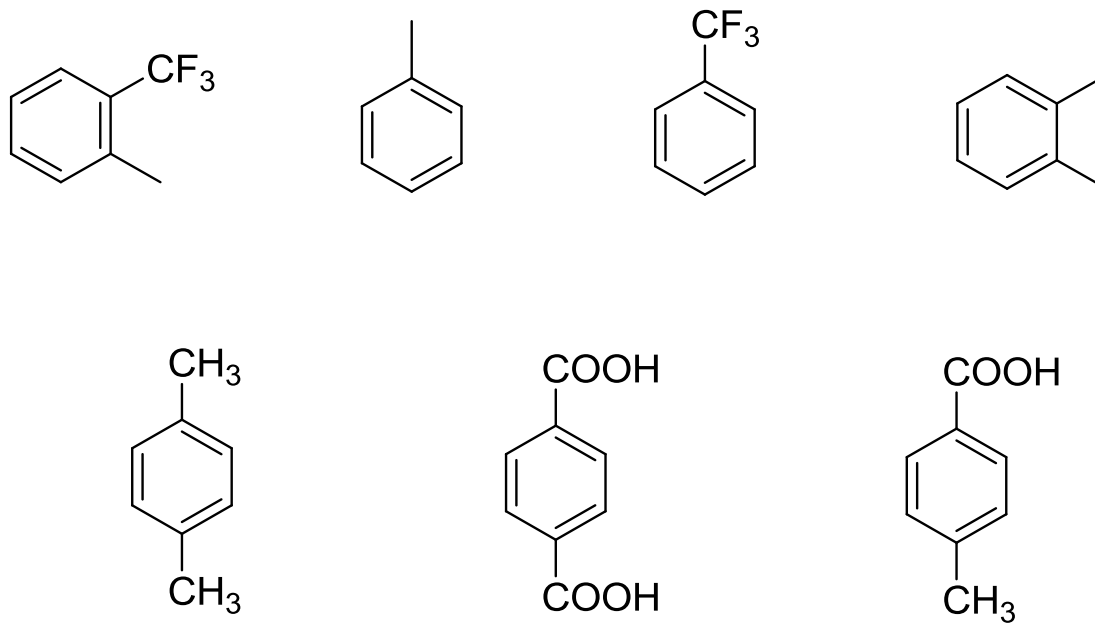
aktivující skupiny

deaktivující skupiny

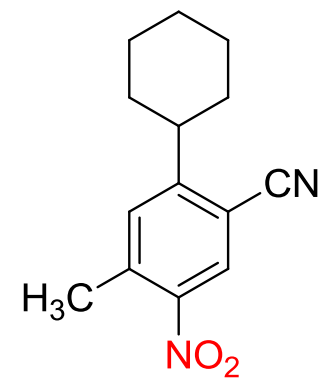
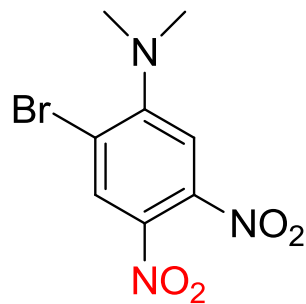
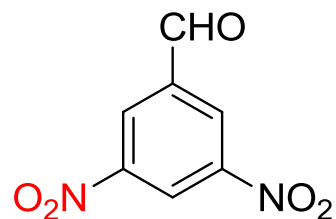
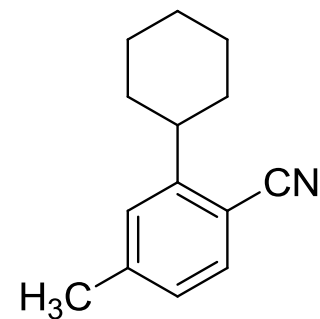
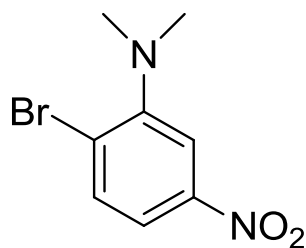
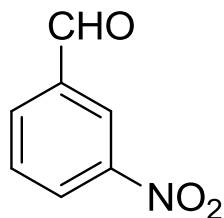
halogeny, o-, p- dirigují
deaktivují



Sloučeniny seřadte podle jejich vzrůstající reaktivity při elektrofilní aromatické substituci



Předpovězte produkt mononitrační reakce



a) Nitrace

b) Sulfonace

c) Halogenace

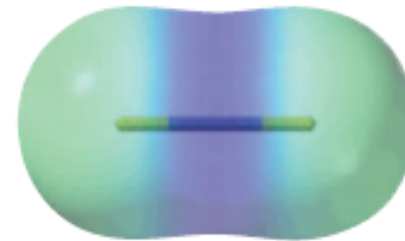
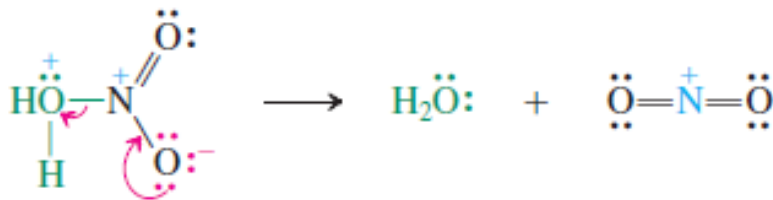
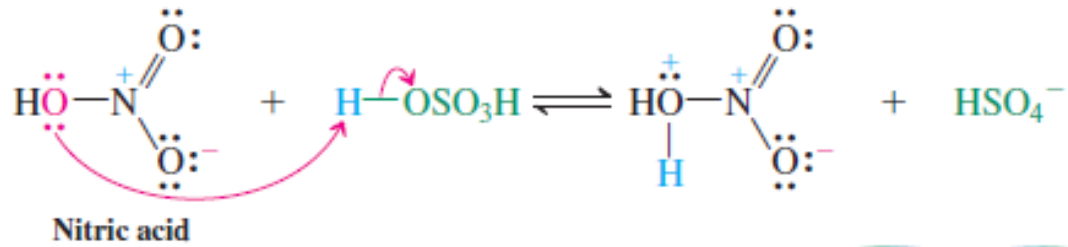
d) Friedl-Craftsova alkylace a acylace

- 1) ne na aromátech se silnými akceptory (CN, NO₂)
- 2) nereagují aromatické halogenderiváty a vinylhalogenidy
- 3) problém vícenásobné substituce, protože zavedením alkyly je produkt pro další elektrofilní substituci reaktivnější
- 4) přesmyky karbokationtů
- 5) nelze provádět na substrátech s aminoskupinou, komplexace Lewisovy kyseliny na volný elektronový pár dusíku

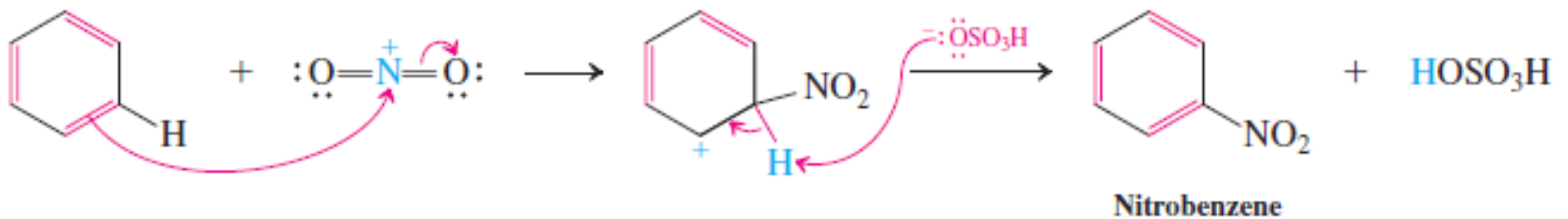
e) Kopulace



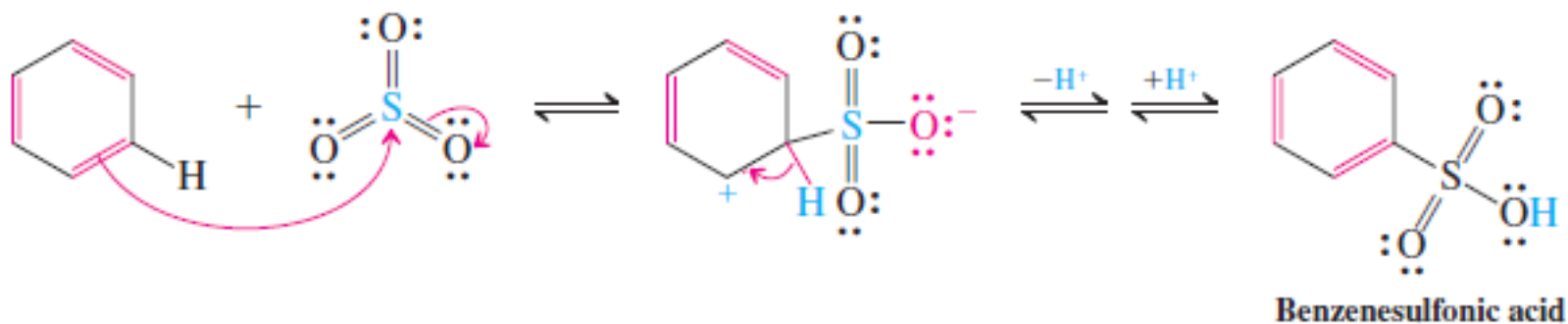
Nitrace



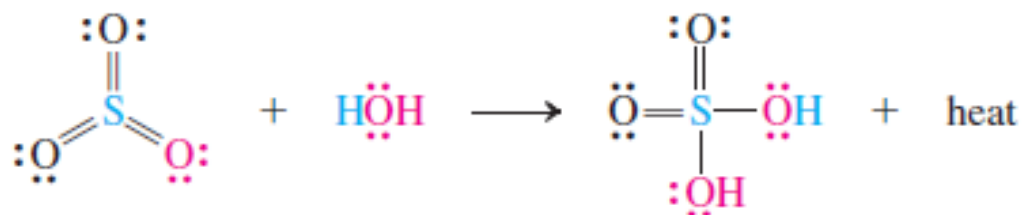
Nitronium ion



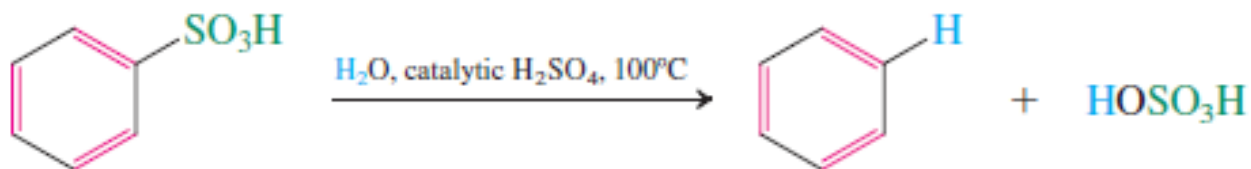
Sulfonace



Hydration of SO₃



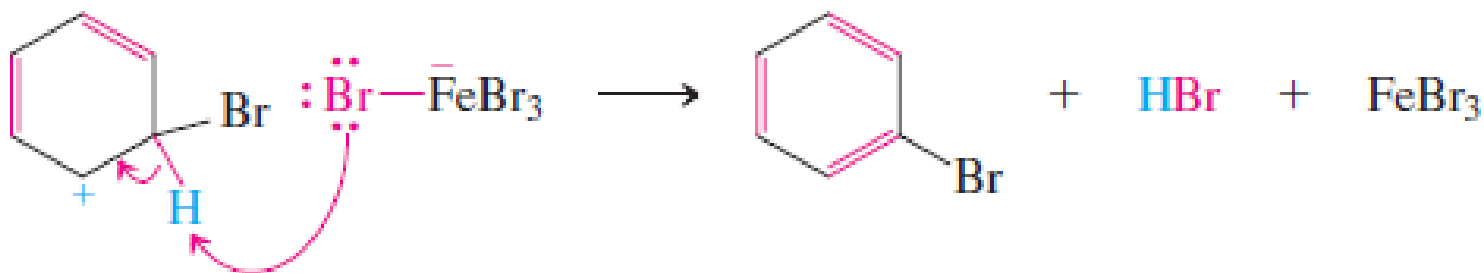
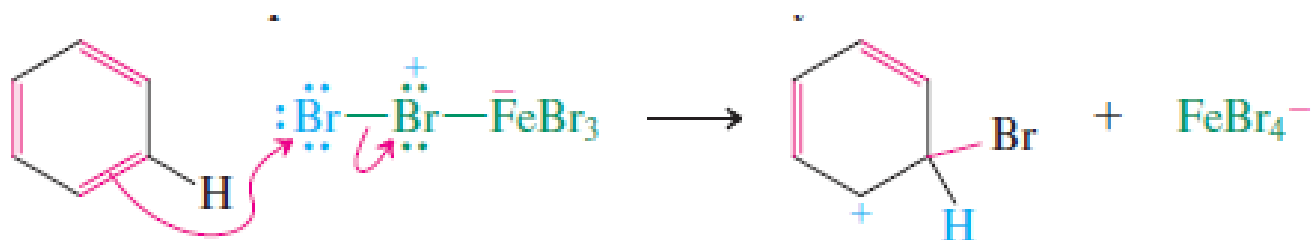
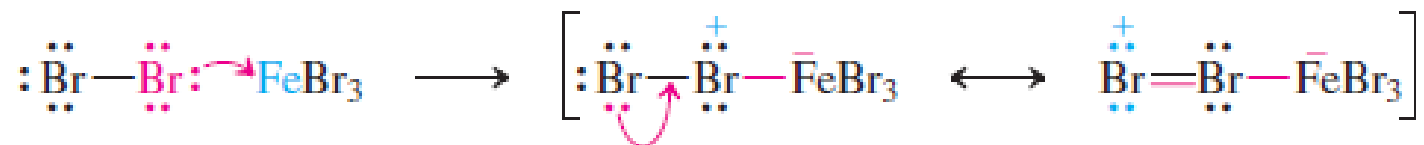
Reverse Sulfonation: Hydrolysis



Aromatic sulfonation is readily reversible. The reaction of sulfur trioxide with water to give sulfuric acid is so exothermic that heating benzenesulfonic acid in dilute aqueous acid completely reverses sulfonation.

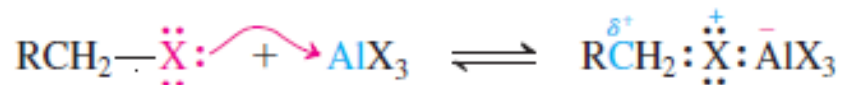


Halogenace

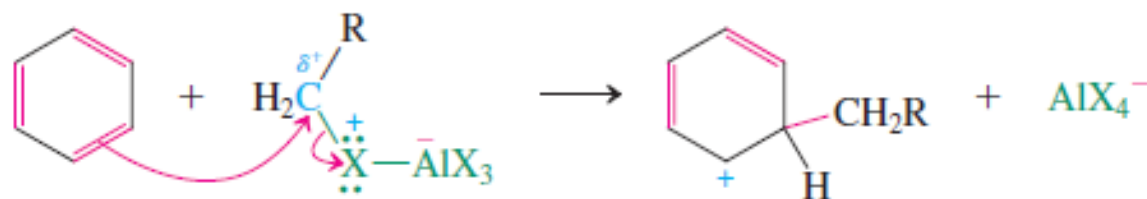


Alkylation

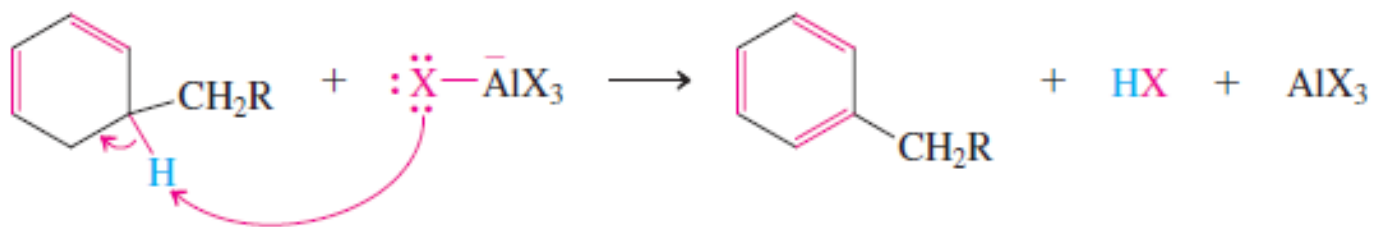
Step 1. Haloalkane activation



Step 2. Electrophilic attack

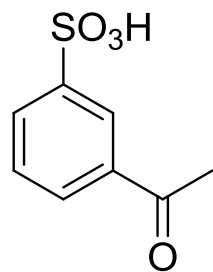


Step 3. Proton loss

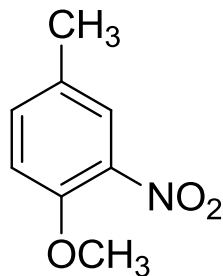
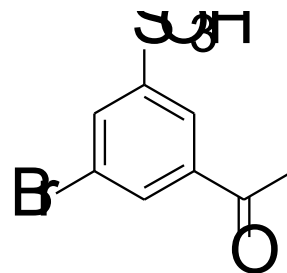
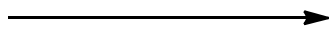


With secondary and tertiary halides, free carbocations are usually formed as intermediates; these species attack the benzene ring in the same way as the cation NO_2^+ .

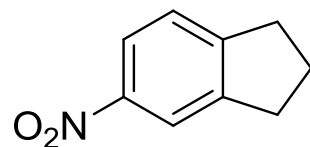
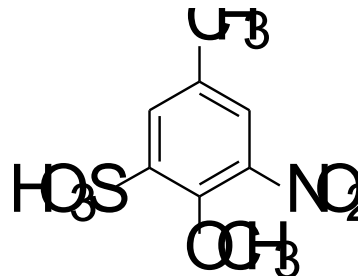




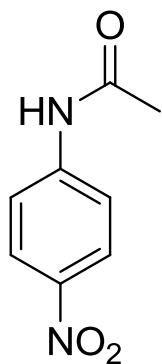
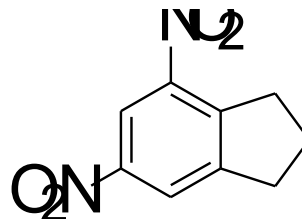
Br₂, FeBr₃



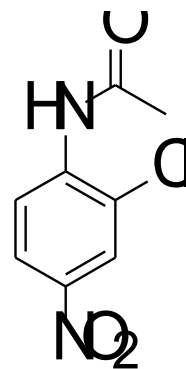
SO₃, H₂SO₄

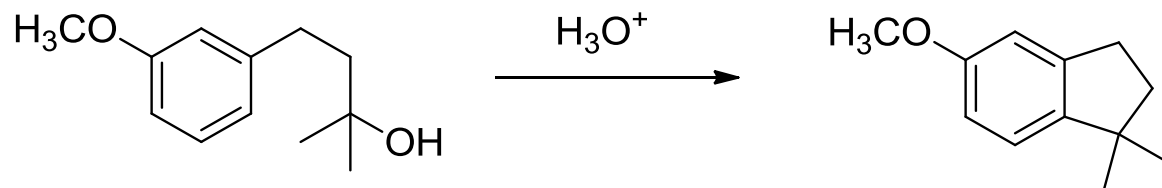
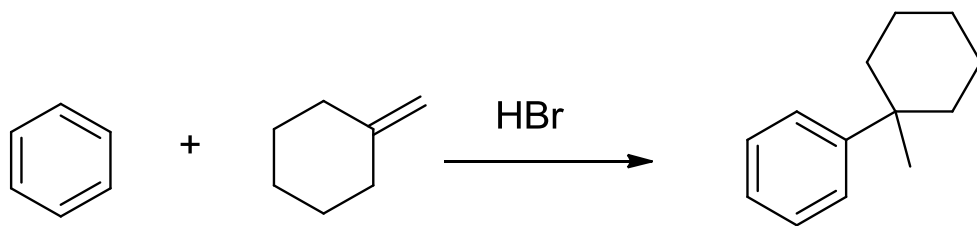
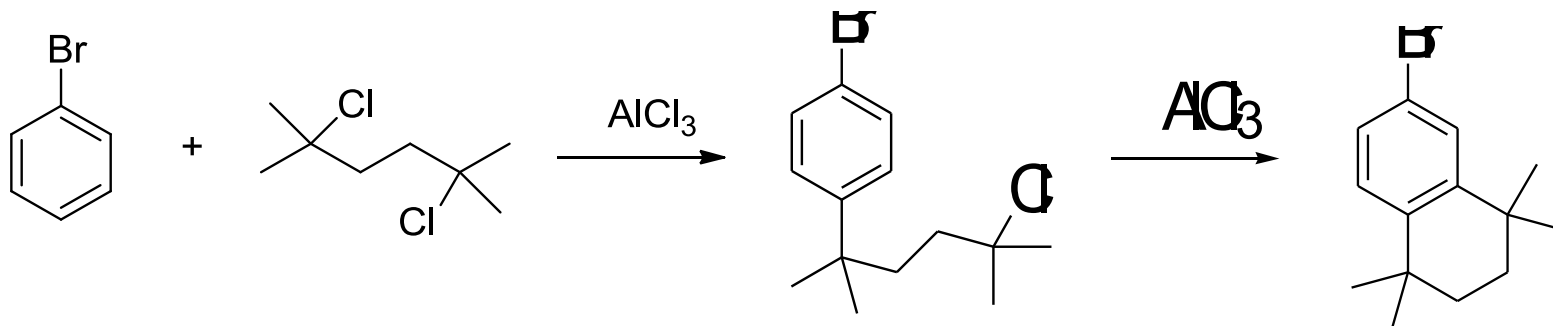


HNO₃, H₂SO₄

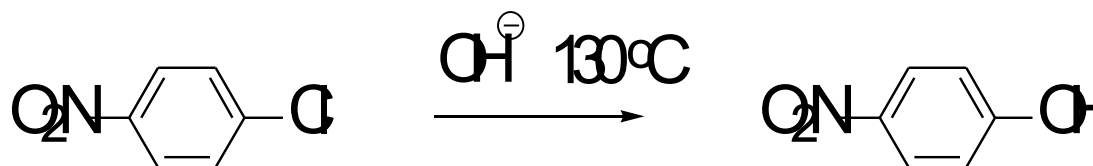
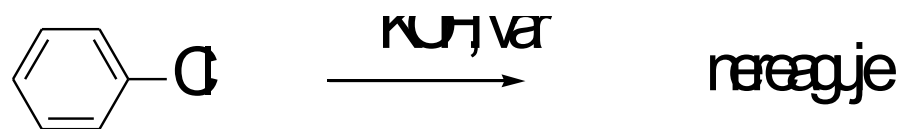


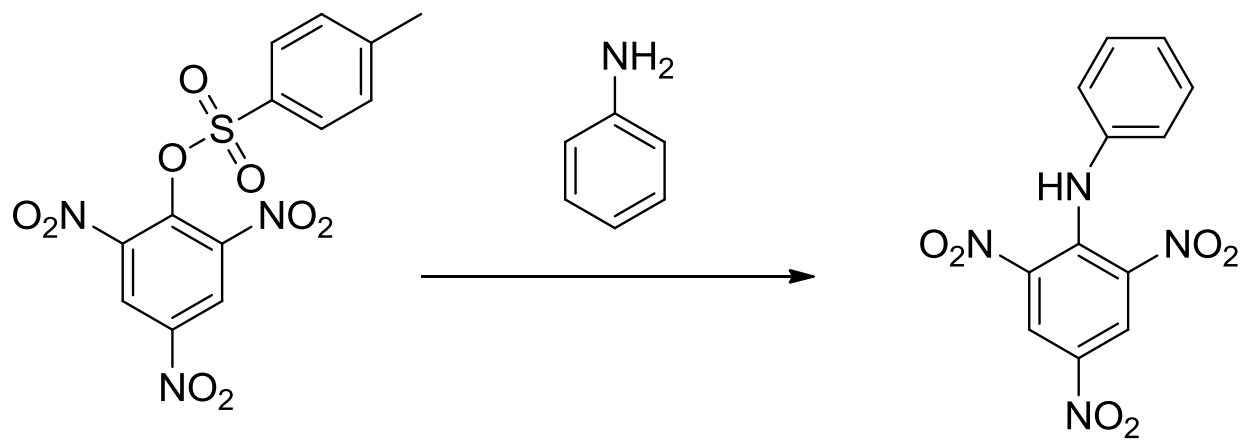
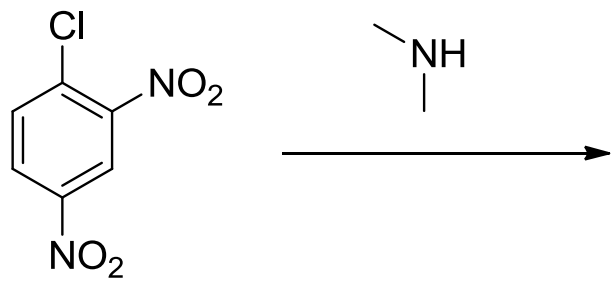
Cl₂, AlCl₃





Nukleofilní aromatická substituce mechanismus Ad - E





Nukleofilní aromatická substituce mechanismus E - Ad

