Today

Chap 17 Reactions at the α-C of a Carbonyl

Aldol Additions
Sections 17.10, 17.12

Benzene and Aromaticity 8.1, 8.2, 8.16 - 8.18

Next Class

Alkylation of the α-C of a Carbonyl
Section 17.6, 17.7

Benzene and Aromaticity 8.1, 8.2, 8.16 - 8.18

Electrophilic Aromatic Substitution
8.16 - 8.21, 18.1 -18.8

Second Class from Today

Test 3 onChap 16 and 17

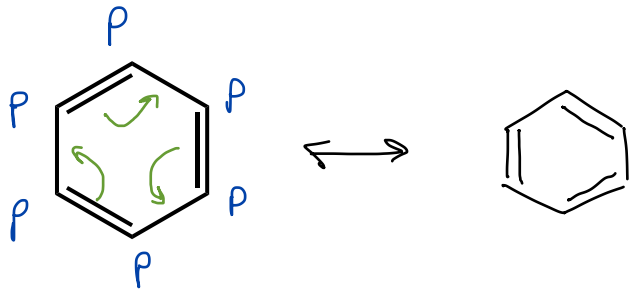
Third Class from Today

Electrophilic Aromatic Substitution
8.16 - 8.21, 18.1 -18.8

Please hand in reworked test 2.

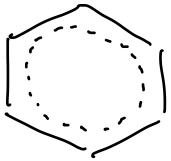
Benzene and resonance

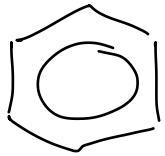
Section 8.1, 8.2



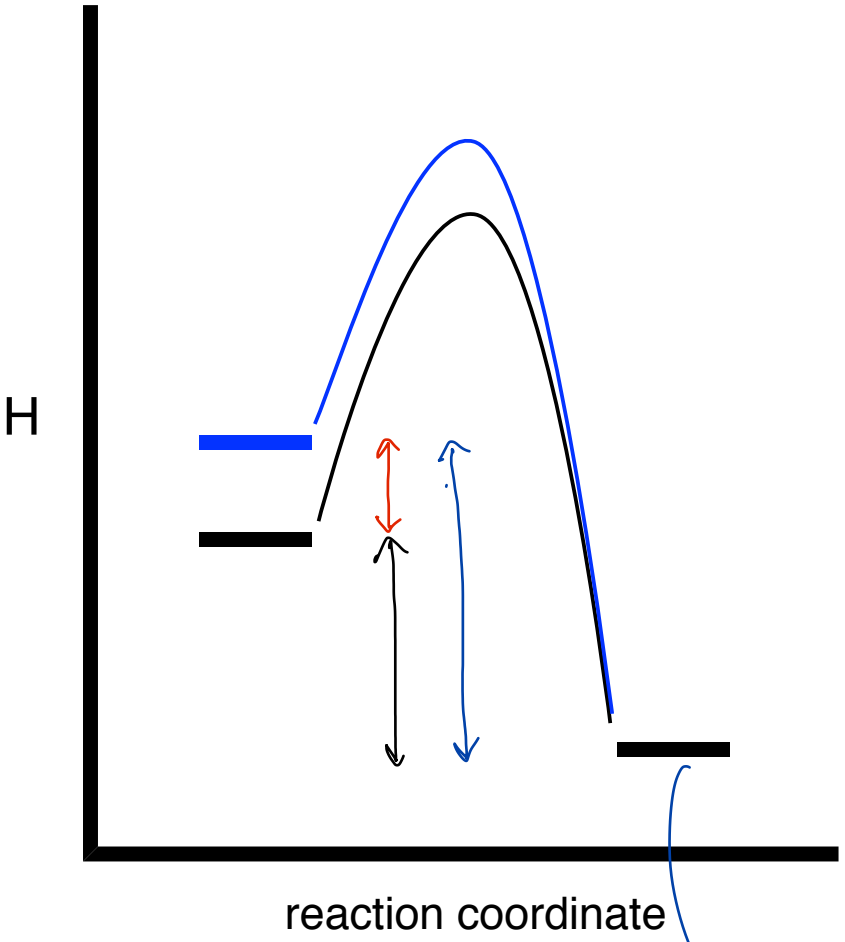
aromaticity

resonance makes π systems more stable, but benzene is more stable than simple resonance can explain





Reactions that produce the same products can be used to compare the stabilities of the reactants



$\Delta H_{rxn} = H_{product} - H_{reactant}$

$\Delta H_{rxn} + H_{reactant} = H_{product}$

$\Delta H_{rxn} = H_{product} - H_{reactant}$

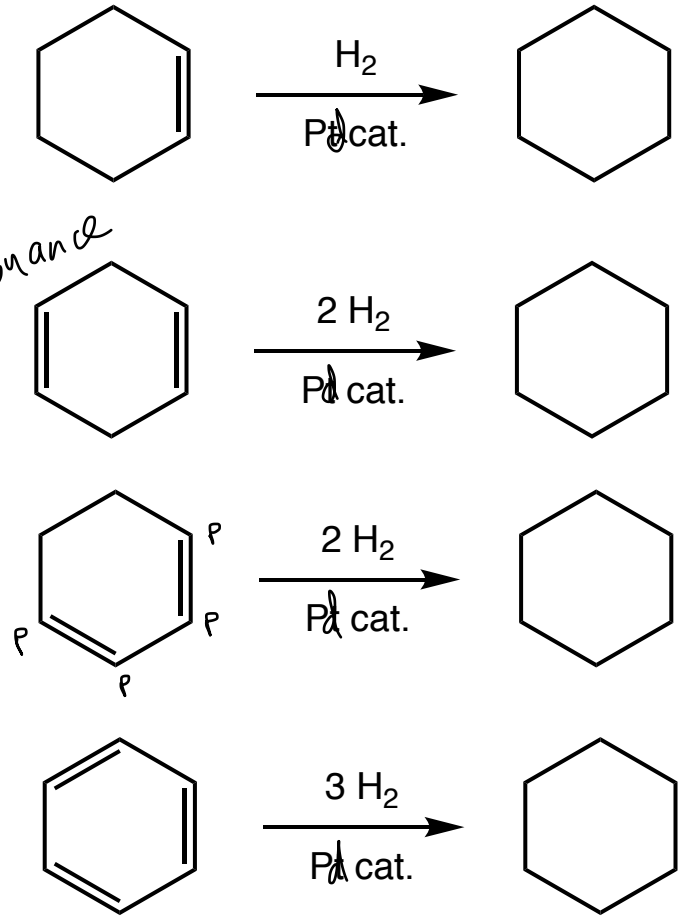
$\Delta H_{rxn} + H_{reactant} = H_{product}$

$\Delta H_{rxn} + H_{reactant} = \Delta H_{rxn} + H_{reactant}$

$\Delta H_{rxn} - \Delta H_{rxn} = H_{reactant} - H_{reactant}$

The difference in E released can be attributed to the energies of the reactants

two reaction that make the same product



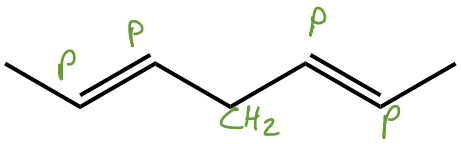
no resonance

	$\Delta H_{reaction}$ (kcal/mol)	per bond (kcal/mol)
cyclohexene	–28.6	–28.6
1,4 cyclohexadiene	–57.4	–28.7
1,3-cyclohexadiene	–55.4	–27.7
benzene	–79.8	– 26.6

these resonance stabilized π bonds are lower in E ... by 1 kcal/mol

the π bonds in benzene ring are more stable than the π bonds in the resonance stabilized 1,3-cyclohexadiene this stability is due to the aromaticity of benzene

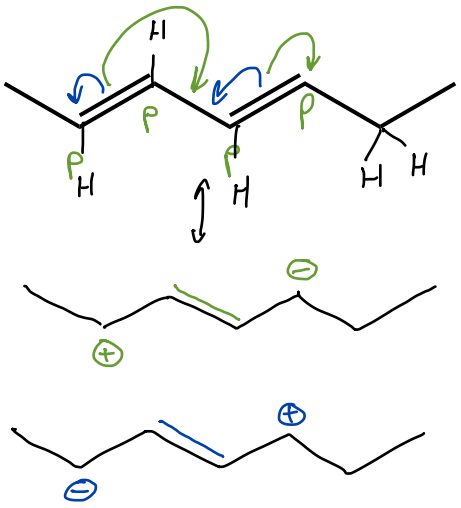
unconjugated π bonds



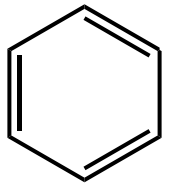
No electron delocalization

CH_2 interupts chain of p orbitals

conjugated π bonds – e⁻ delocalization resonance

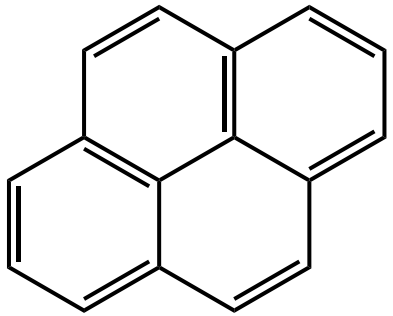


conjugated aromatic π bonds



conjugated π bonds arranged just so are more stable

conjugated antiaromatic π bonds

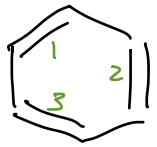


conjugated π bonds arranged differently give an less stable π system

conjugated yes
aromatic no

Criteria for Aromaticity

1.Uninterupted π cloud
- •cyclic
- •p orbital on every atom
- •planar



conjugated yes
cyclic yes
aromatic yes odd # of pairs

2. odd number of pairs of electrons or 4n+2 e⁻'s

2, 6, 10 ....

Criteria for Antiaromaticity

1.Uninterupted π cloud
- •cyclic
- •p orbital on every atom
- •planar

2. even number of pairs of electrons or 4n e⁻'s in the π system

n is just a number not the number of C, H's or anything else