Aromatics I

Occurrence

Mol. Features

Naming

Ref 14: 1 – 4 (both ed[ns])

Prob 14: 16, 17 (8th ed.)
14: 17, 18 (9th ed.)

Adv Rdg 14: 6 – 9, 11 (both ed[ns])

Occurrence

originally: "cmpds from aromatic plants"
(*extracted like trimyristin from nutmeg*)

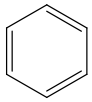
e.g.,

eugenol,
(*f rom cloves*)

cinnamaldehyde,
(*f rom cinnamon*)

now: "cyclic cmpds w/ conjugated π systems"

e.g.



benzene, C_6H_6
most comment parent cmpd

Industrial Sources

1.) traditionally, from coal

coal $\xrightarrow[(heating\ w/t\ air)]{\text{"coking"}}$ coke (*metallurgical*) + coal tar (*volatiles*)

"volatiles" contain:

2.) now mostly from petroleum (crude oil)

petroleum $\xrightarrow[(heating\ w/t\ air)]{\text{"pyrrolysis"}}$

(*pyrrolysis = ~heating w/t air in presence of catalyst*)

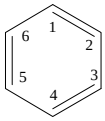
Molecular Features

- conjugated ring systems
- high degree of unsaturation (D of U)
- most common,  , C_6H_6, benzene
  D of U =4, all C's are sp^2,
  flat, all nuclei in the same plane
- but also

•do not react like normal alkenes;
e.g. don't react with Br_2, $KMnO_4$,

- are much more stable !!

molecular ...



does **not** have different bond types,
(i.e., C1 – C2 double bond and
C2 – C3 single bond)

but, rather, all C – C bonds are the same
(*all bond lengths 139 pm; single = 147 pm, double = 133 pm*)

explanation:
1.) resonance stabilizes system

normally shown in "delocalized" form:

2.) by MO Theory: later

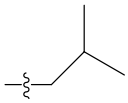
Naming of Benzene Derivatives

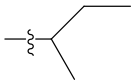
- similar to cyclohexane rule
  (of course, no cis/trans; R/S)
- recall substituents:

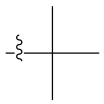
  halo, Me, Et, Pr, Bu

  also:


isopropyl


isobutyl

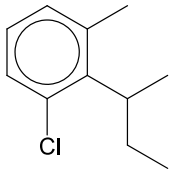

s-butyl

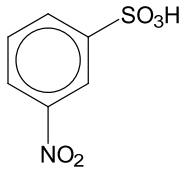

t-butyl

naming ...

2 new substituents:

Practice

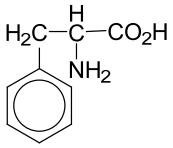


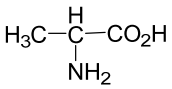


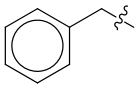
Common Names, Symbols

phenyl group:

e.g.,







common ...

toluene xylene(s) phenol

benzoic acid aniline

styrene naphthalene

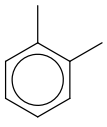
passive knowledge required:

given name, know what the structure is.

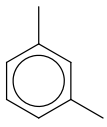
Di-Substitution

1,2	ortho	o	*close*
1,3	meta	m	*middle*
1,4	para	p	*opposite*

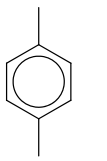
e.g.,



o - xylene



m - xylene



p - xylene

Practice