Al-Mustaqbal University College

Department of Medical Physics

First Class

General Chemistry

Lec 5 Huckle's rule

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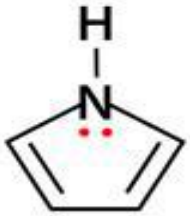
Huckle's rule

An aromatic compound must contain (4n + 2) π electrons, where (n = 0, 1, 2,). When substituting by the n-values in the equation, a one of the huckle's number (2,6,10,14…) is produced.

For the rule to apply to the compound, the number of π-electrons in the compound must be equal to one of the huckle's numbers

n =	0	1	2	3
4n+2	2	6	10	14

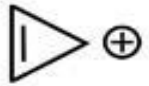
Benzene
Pi electrons = 6
n = 1



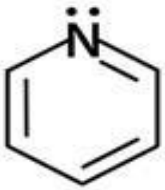
Pyrrole
Pi electrons = 6
n = 1

Furan
Pi electrons = 6
n = 1

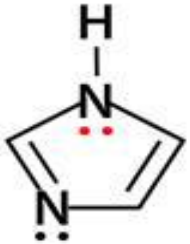
Thiophene
Pi electrons = 6
n = 1



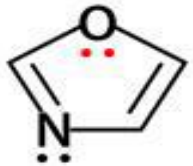
Cyclopropenyl ion
Pi electrons = 2
n = 0



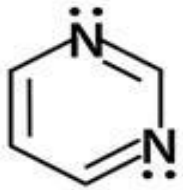
Pyridine
Pi electrons = 6
n = 1



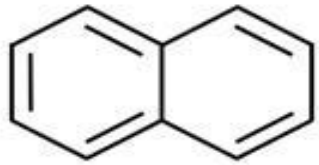
Imidazole
Pi electrons = 6
n = 1



Oxazole
Pi electrons = 6
n = 1



Pyrimidine
Pi electrons = 6
n = 1

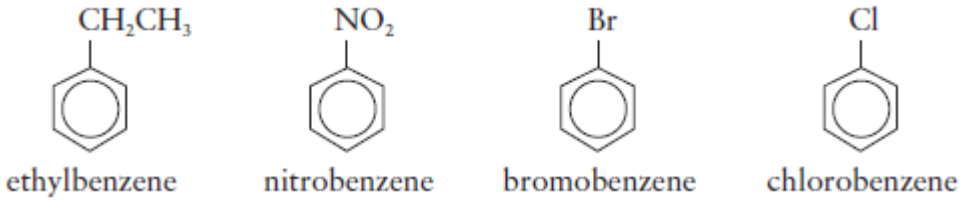


Napthalene
Pi electrons = 10
n = 2

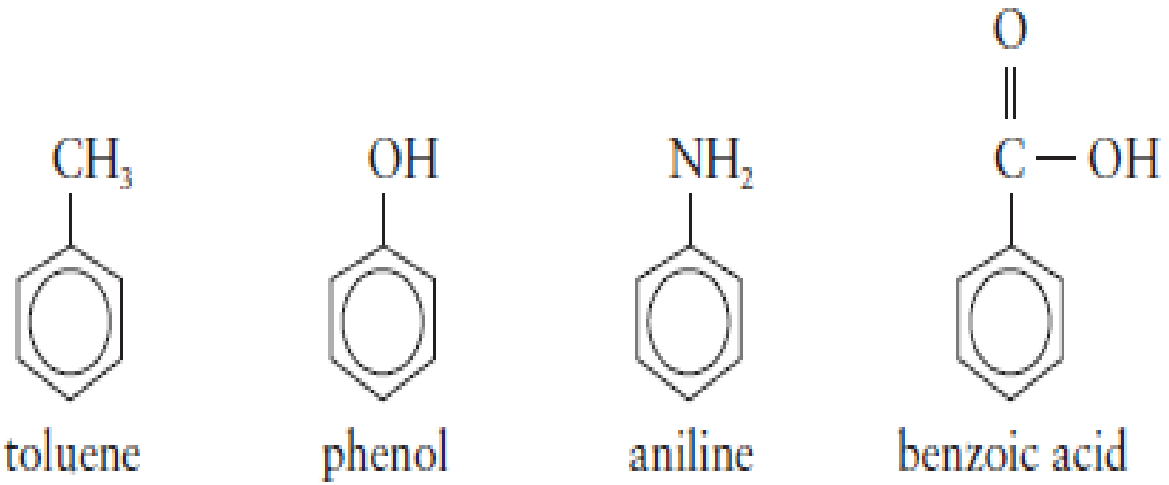
The Nomenclature of Benzene Derivatives

The following guidelines are all based on the IUPAC aromatic nomenclature system

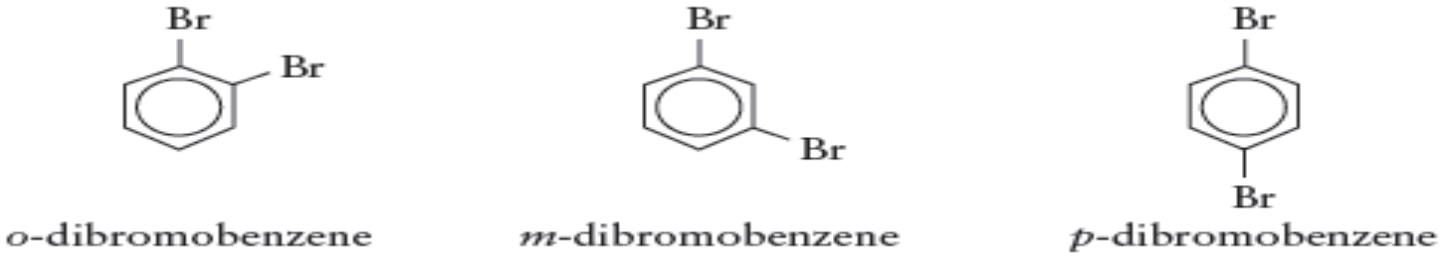
Guideline 1. When a single hydrogen of the benzene ring is replaced, the compound can be named as a derivative of benzene:



- ***Guideline 2.*** A number of benzene derivatives are known by common names that are also IUPAC-accepted. Thus, toluene is favored over methylbenzene, and aniline is used rather than aminobenzene:

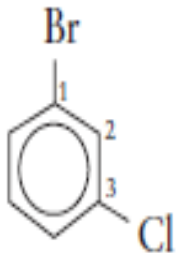


Guideline 4. When two groups are attached to a benzene ring, three isomeric structures are possible. They can be designated by the prefixes *ortho (o), meta (m),* and *para (p):*

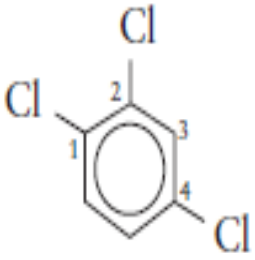


o-dibromobenzene *m*-dibromobenzene *p*-dibromobenzene

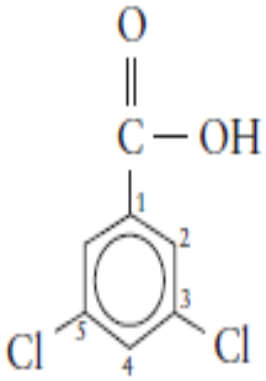
Guideline 5. When two or more groups are attached to a benzene ring, their positions can be indicated by numbering the carbon atoms of the ring so as to obtain the lowest possible numbers for the attachment positions. Groups are arranged in alphabetical order. If there is a choice of identical sets of numbers, the group that comes first in alphabetical order is given the lower number. IUPAC-acceptable common names may be used:



m-bromochlorobenzene
or 1-bromo-3-chlorobenzene



1,2,4-trichlorobenzene



3,5-dichlorobenzoic acid

GOOD LUCK