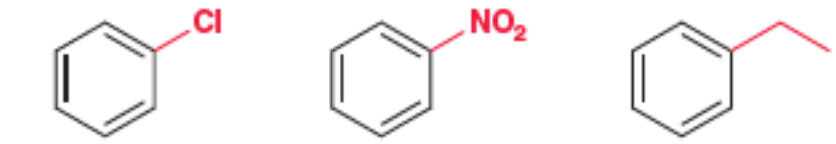
Nomenclature of Benzene Derivatives

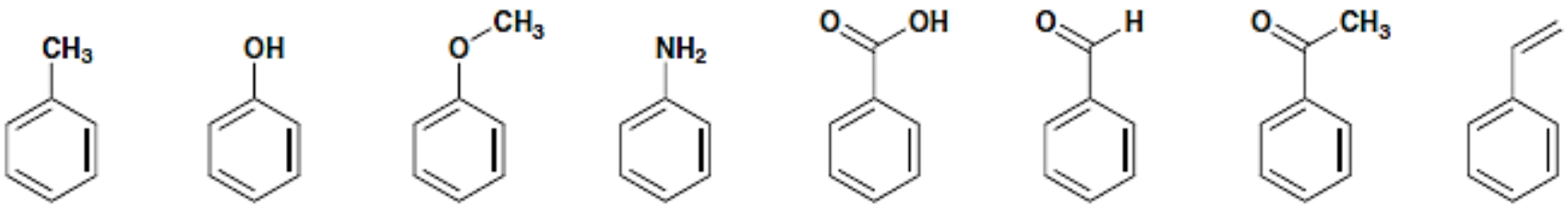
Monosubstituted Derivatives of Benzene:

Monosubstituted derivatives of benzene are named systematically using benzene as the parent and listing the substituent as a prefix. Below are several examples.



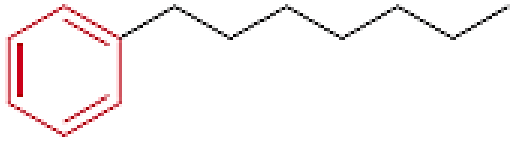
Chlorobenzene Nitrobenzene Ethylbenzene

The following are some monosubstituted aromatic compounds that have common names accepted by IUPAC. You must commit these names to memory, as they will be used extensively throughout the remaining chapters.



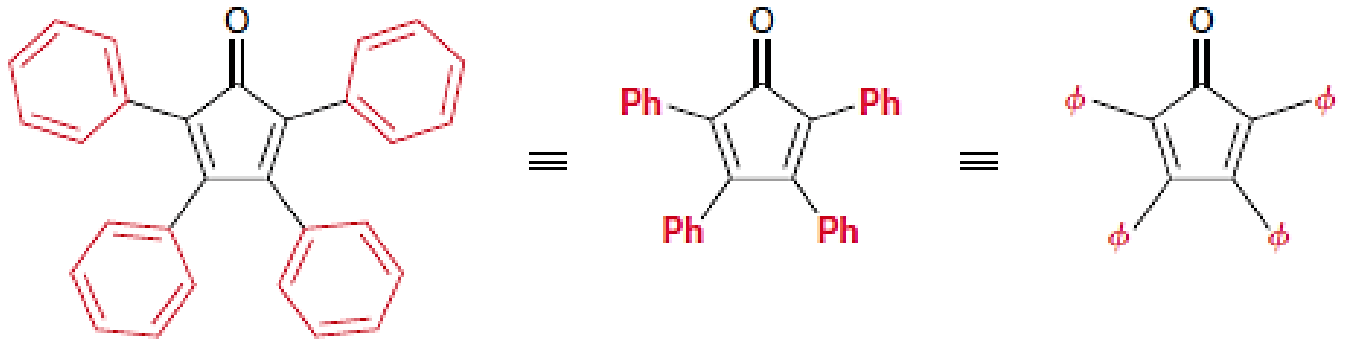
Toluene Phenol Anisole Aniline Benzoic acid Benzaldehyde Acetophenone Styrene

If the substituent is larger than the benzene ring (i.e., if the substituent has more than six carbon atoms), then the benzene ring is treated as a substituent and is called a **phenyl group**.



1-Phenylheptane

The presence of phenyl groups is often indicated with the letters **Ph** or with the Greek letter phi (ϕ)

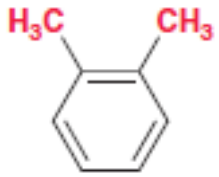


Tetraphenylcyclopentadienone

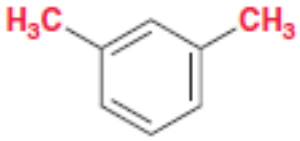
Phenyl groups bearing substituents are sometimes indicated with the letters **Ar**, indicating the presence of an aromatic ring.

Disubstituted Derivatives of Benzene

Dimethyl derivatives of benzene are called xylene, and there are three constitutionally isomeric xylenes.



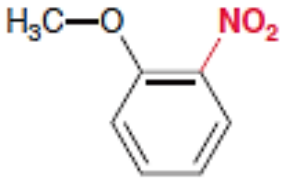
ortho-Xylene
(1,2-dimethylbenzene)



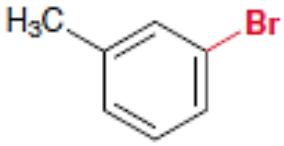
meta-Xylene
(1,3-dimethylbenzene)

para-Xylene
(1,4-dimethylbenzene)

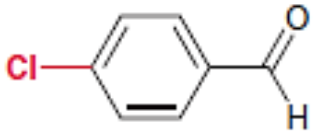
These isomers differ from each other in the relative positions of the methyl groups and can be named in two ways: (1) using the descriptors ***ortho***, ***meta***, and ***para*** or (2) using locants (i.e., 1,3 is the same as *meta*). Both methods can be used when the parent is a common name:



ortho-Nitroanisole
(2-Nitroanisole)



meta-Bromotoluene
(3-Bromotoluene)



para-Chlorobenzaldehyde
(4-Chlorobenzaldehyde)

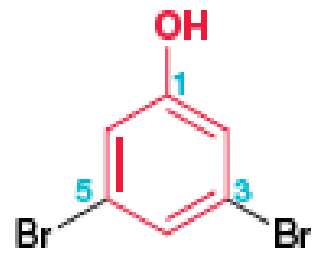
Polysubstituted Derivatives of Benzene

The descriptors *ortho*, *meta*, and *para* cannot be used when naming an aromatic ring bearing three or more substituents.

When naming a polysubstituted benzene ring, we will follow the same four-step process used for naming alkanes, alkenes, alkynes, and alcohols.

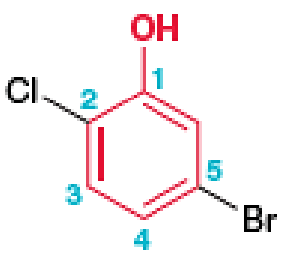
1. Identify and name the parent.
2. Identify and name the substituents.
3. Assign a locant to each substituent.
4. Arrange the substituents alphabetically.

When identifying the parent, it is acceptable (and common practice) to choose a common name.

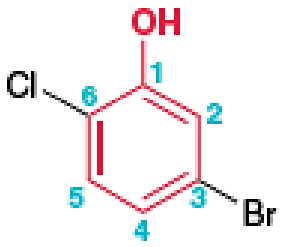


3,5-Dibromophenol

Correct



Incorrect



Homework:

Provide a systematic name for each of the following compounds: