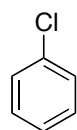


Intermediate IUPAC Nomenclature VII

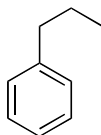
Benzenes

- When a single substituent is present on a benzene it is a monosubstituted benzene.
 - Monosubstituted benzenes are with the base name benzene and using the substituent group as a prefix.
 - The substituent is always at C-1 so there is no need to number its location.

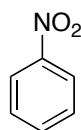
Examples of monosubstituted benzenes:



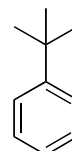
chlorobenzene



propylbenzene



nitrobenzene

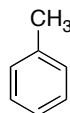


tert-butylbenzene
or
(1,1-dimethylethyl)benzene

- Many monosubstituted benzenes have common names, some of these names have been included in IUPAC nomenclature as base names for the structure.

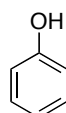
Common names of monosubstituted benzenes:

common name (full IUPAC name)



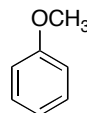
toluene

(methylbenzene)



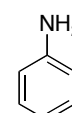
phenol

(benzenol)



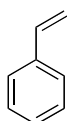
anisole

(methoxybenzene)



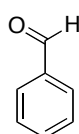
aniline

(benzenamine)



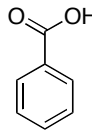
styrene

(ethenylbenzene)



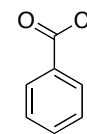
benzaldehyde

(benzenecarbaldehyde)



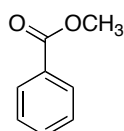
benzoic acid

(benzenecarboxylic acid)



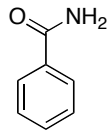
benzoyl chloride

(benzenecarbonyl chloride)



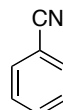
methyl benzoate

(methyl benzenecarboxylate)



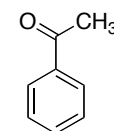
benzamide

(benzenecarbamide)



benzonitrile

(benzenecarbonitrile)



acetophenone

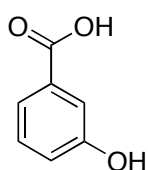
(1-phenyl-1-ethanone)

Common names in bold face are considered to be IUPAC correct base names for structures.

Multiply substituted benzenes:

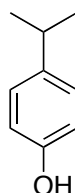
- Disubstituted benzenes occur when two substituents are present on a benzene ring.
 - If a nonbenzene base name is used the carbon with that substituent is C-1.
 - If there is a higher priority substituent and benzene is the base name that carbon is C-1.
 - If both substituents are the same priority then carbon with the first in alphabetical order is C-1.

Examples of disubstituted benzenes:



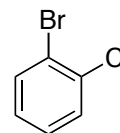
3-hydroxybenzoic acid

acid is higher priority than alcohol.



4-isopropylphenol
(4-(1-methylethyl)-phenol)

The phenol alcohol is C-1

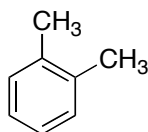


1-bromo-2-chlorobenzene

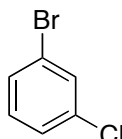
bromo is before chloro in the alphabet

- Disubstituted benzenes have common names referring to the relationship between the two substituents.
 - Ortho substituents are adjacent (1,2)
 - Meta substituents are separated by one carbon (1,3)
 - Para substituents are opposite each other (1,4)
- Ortho-, meta-, para- (*o*-, *m*-, *p*-) are used in the front of the name to indicate position.

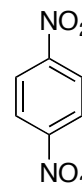
Using ortho-, meta-, para- examples:



ortho-dimethylbenzene
or
ortho-methyltoluene



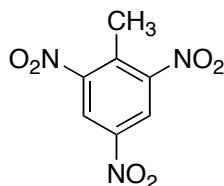
meta-bromochlorobenzene
or
m-bromochlorobenzene



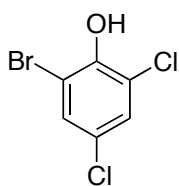
para-dinitrobenzene
or
p-dinitrobenzene

- Multiply substituted benzenes have more than two substituents:
 - If there is a high priority substituent that substituent is C-1
 - If there are no high priority substituents then the ring is numbered to give the lowest possible numbers
 - If the numbers are the same then alphabetical order is used
 - If a non-benzene base name is used (e.g. phenol) the substituent that is part of the base name is always carbon 1.

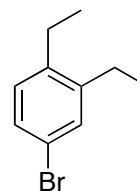
Examples of multiply substituted benzenes:



2,4,6-trinitrotoluene
(the CH₃ is at C-1)



2-bromo-4,6-dichlorophenol
(Bromo is before chloro
alphabetically)



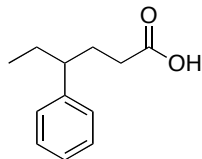
4-bromo-1,2-diethylbenzene
(1,2 is less than 1,3)

- Benzenes with long-chain, higher priority substituents, or complex substituents may be named with benzene as a substituent and the longer chain as the base name.
 - A Phenyl group is a benzene substituent
 - A benzyl group is a benzene-CH₂- substituent
 - The CH₂ on the benzyl will not be part of a larger chain or we could name that chain with an extra carbon and a phenyl group.

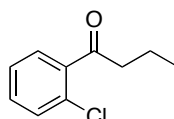
Examples of benzene as a substituent:



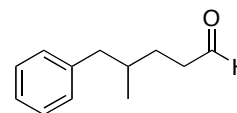
a **phenyl** group



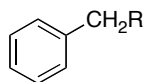
4-phenylhexanoic acid



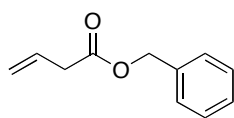
1-(2-chlorophenyl)-1-butanone



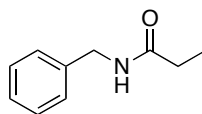
4-methyl-5-phenylpentanal is correct



a **benzyl** group



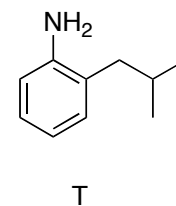
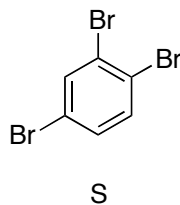
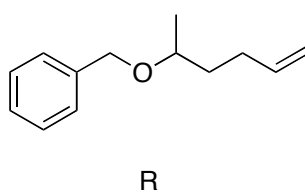
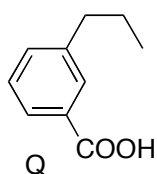
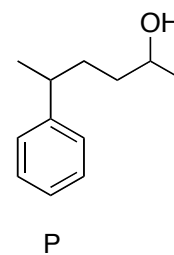
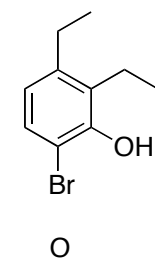
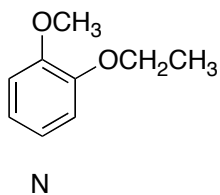
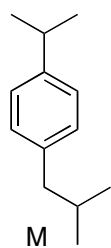
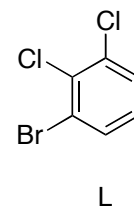
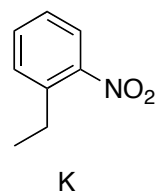
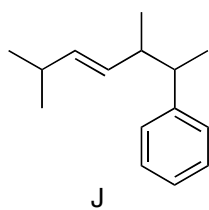
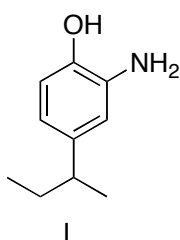
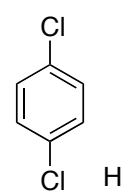
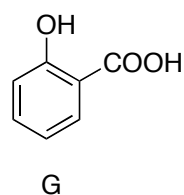
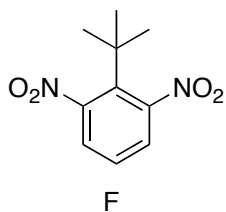
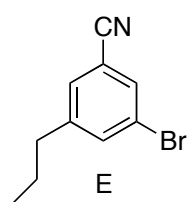
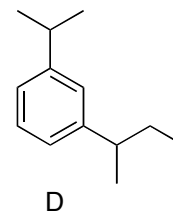
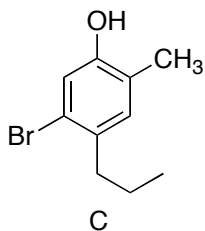
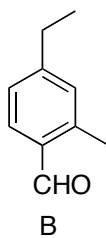
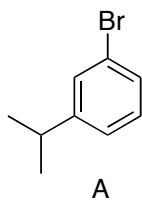
benzyl 3-butenate



N-benzylpropanamide

4-benzyl-4-methylbutanal is incorrect

Practice Benzene Nomenclature:



Practice Benzene Nomenclature Answers:

- Compound A: *meta*-bromoisopropylbenzene or 1-bromo-3-methylethylbenzene
- Compound B: 4-ethyl-2-methylbenzaldehyde
- Compound C: 5-bromo-2-methyl-4-propylphenol
- Compound D: *meta-sec*-butylisopropylbenzene or
1-methylethyl-3-(1-methylpropyl)benzene
- Compound E: 3-bromo-5-propylbenzonitrile
- Compound F: 2-(1,1-dimethylethyl)-1,3-dinitrobenzene
- Compound G: 2-hydroxybenzoic acid or *ortho*-hydroxybenzoic acid
- Compound H: *para*-dichlorobenzene or 1,4-dichlorobenzene
- Compound I: 2-amino-4-*sec*-butylphenol or 2-amino-4-(1-methylpropyl)phenol
- Compound J: *trans*-2,5-dimethyl-6-phenyl-3-heptene
- Compound K: *ortho*-ethylnitrobenzene or 1-ethyl-2-nitrobenzene
- Compound L: 1-bromo-2,3-dichlorobenzene
- Compound M: *para-sec*-butylisopropylbenzene or
1-methylethyl-4-(2-methylpropyl)benzene
- Compound N: *ortho*-ethoxymethoxybenzene or 1-ethoxy-2-methoxybenzene
- Compound O: 5-bromo-2,3-diethylphenol
- Compound P: 5-phenyl-2-hexanol
- Compound Q: *meta*-propylbenzoic acid or 3-propylbenzoic acid
- Compound R: 5-benzoxy-1-hexene
- Compound S: 1,2,4-tribromobenzene
- Compound T: *ortho*-isobutylaniline or 2-(2-methylpropyl)aniline