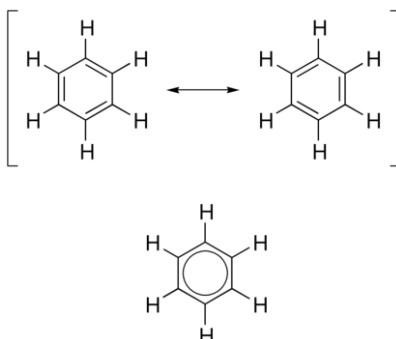


1.3 Aromatic Hydrocarbons

Benzene was first discovered by Michael Faraday, in 1825, while isolating compounds in an oil mixture.



Uses

Benzene has been used in:

- Aftershave
- To decaffeinate coffee
- Gasoline additive
- Solvent in many industrial processes.

But it was discovered to be a carcinogen (causes cancer) and has been replaced by other compounds.

What Is an Aromatic Hydrocarbon?

An aromatic hydrocarbon is an unsaturated hydrocarbon that has a ring structure and a bonding arrangement that causes it to be chemically stable.

Benzene, C_6H_6 , is a flat 6-carbon ring with a hydrogen atom bonded to each carbon atom.

It is the simplest aromatic hydrocarbon.

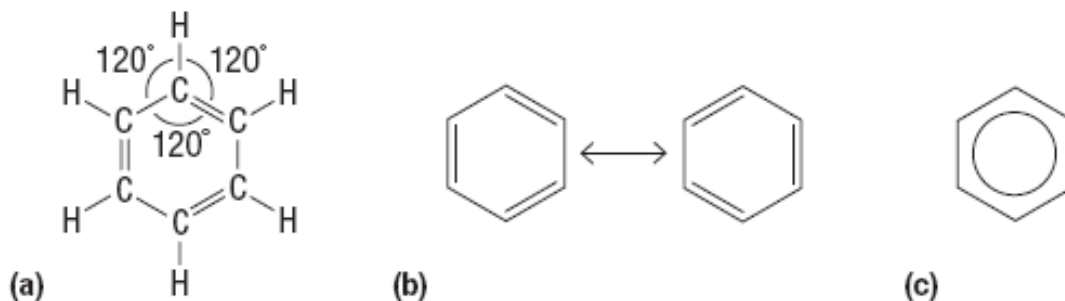
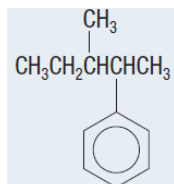
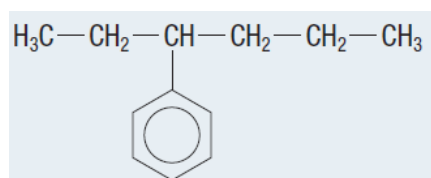


Figure 2 (a) The structure of benzene, a planar ring system in which all bond angles are 120°
 (b) Two structural formulas implying that the structure of benzene is a combination of them both together
 (c) The common representation of benzene

Naming Aromatic Compounds

1. When benzene is a substituent on a carbon chain

It loses a hydrogen atom to become a phenyl group. It is used like a methyl group.



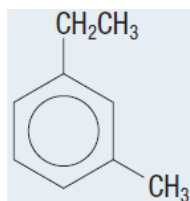
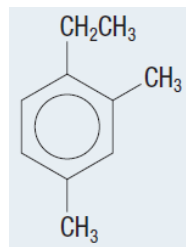
Traditional Names for Aromatic Hydrocarbons

An older naming convention for substituted aromatic compounds used the Greek prefixes *ortho-*, *meta-*, and *para-* to indicate the positions of substituents. Ortho substituents are on adjacent carbon atoms in 1,2 positions. Meta substituents are separated by 1 carbon atom in 1,3 positions. Para substituents are located on opposite sides of the 6-carbon ring in 1,4 positions.

2. When it is the parent molecule

The attached functional groups are named as substituents to benzene.

-benzene



Drawing Aromatic Compounds

4,6-diphenyloct-2-ene

2-phenylbut-2-ene

1-bromo-2-chloro-4-ethylbenzene

1-fluoro-3-methylbenzene

Properties of Aromatic Hydrocarbons

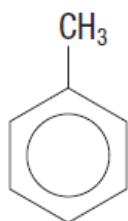
Many aromatic hydrocarbons are

- liquids at room temperature
- others are crystalline solids

They are non-polar unless they contain an electronegative substituent.

They are generally insoluble in water.

One replacement compound is methylbenzene, commonly known as toluene, $C_6H_5CH_3$

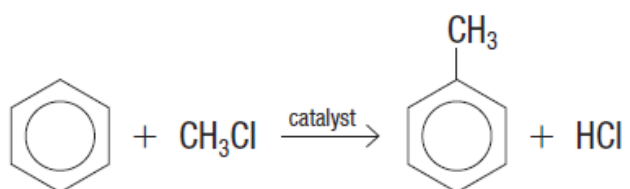
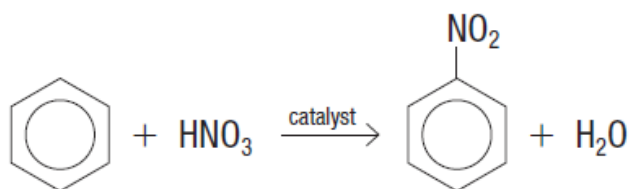
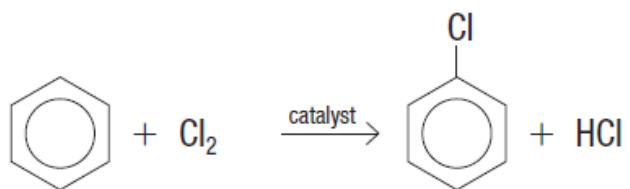


toluene

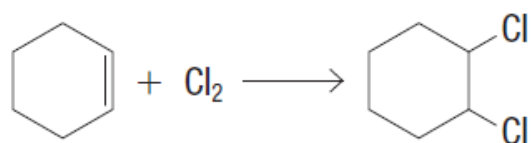
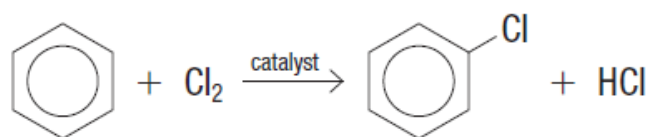
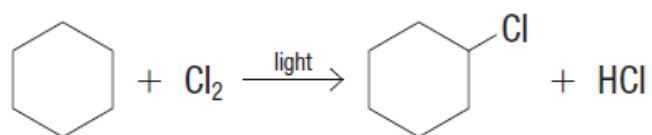
Reactions of Aromatic Compounds

Aromatic compounds are much less reactive than alkenes

Benzene does undergo substitution reactions in which hydrogen atoms are replaced by other atoms, such as halogens



Benzene reacts more like a saturated hydrocarbon because of the specialized bonding in the benzene ring



Worksheet 1.3: Aromatic Hydrocarbons

p.31 Q. 1, 2, 3, 4, 5