Hydrocarbon Organic Compounds and Aromatic Rings

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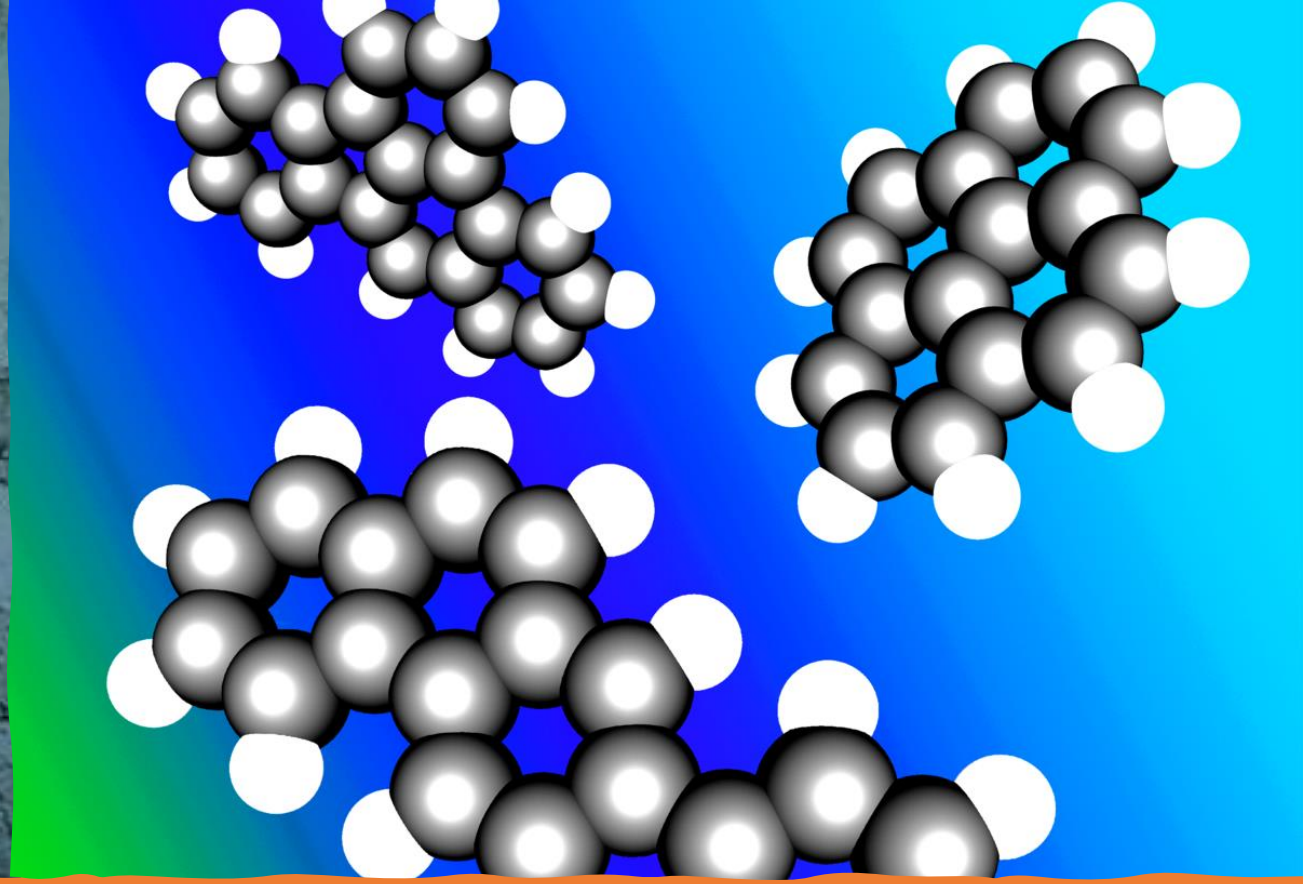
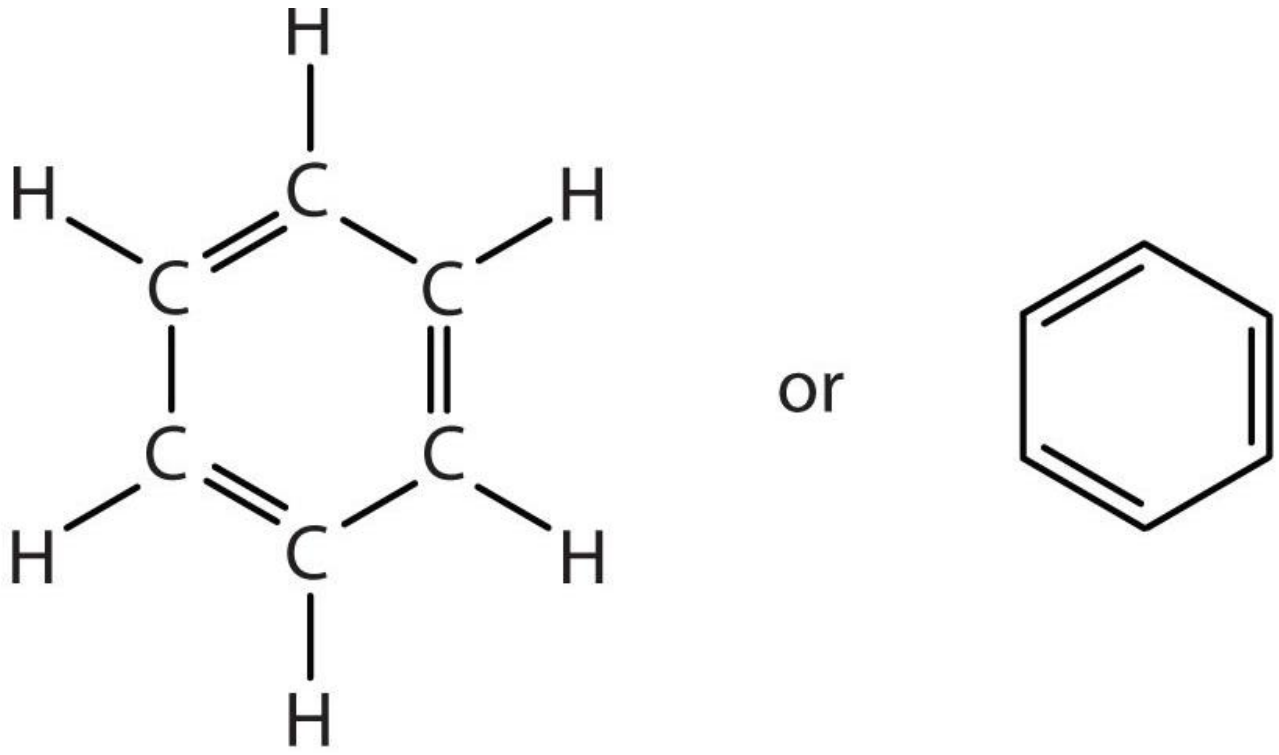


Aromatic Hydrocarbons

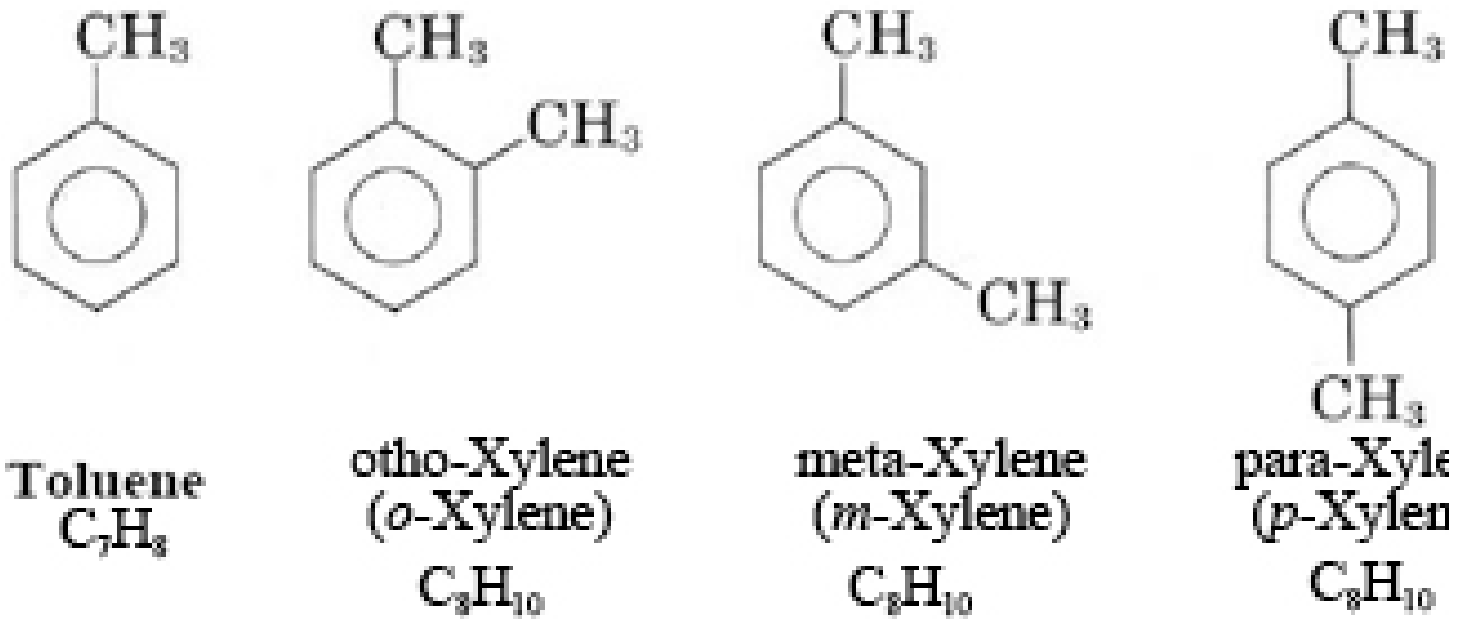
A class of unsaturated hydrocarbons which have one or more planar six-carbon rings called benzene rings, to which hydrogen atoms and other atoms can be attached.

Long-term effects of being exposed to Aromatic Hydrocarbon: cataracts, kidney and liver damage, and jaundice, contact to the skin can be irritating, breathing in large quantities results in the breakdown of red blood cells.



Molecular Formula for Benzene: C_6H_6

Structural formula will change with different functionalization of the aromatic ring.



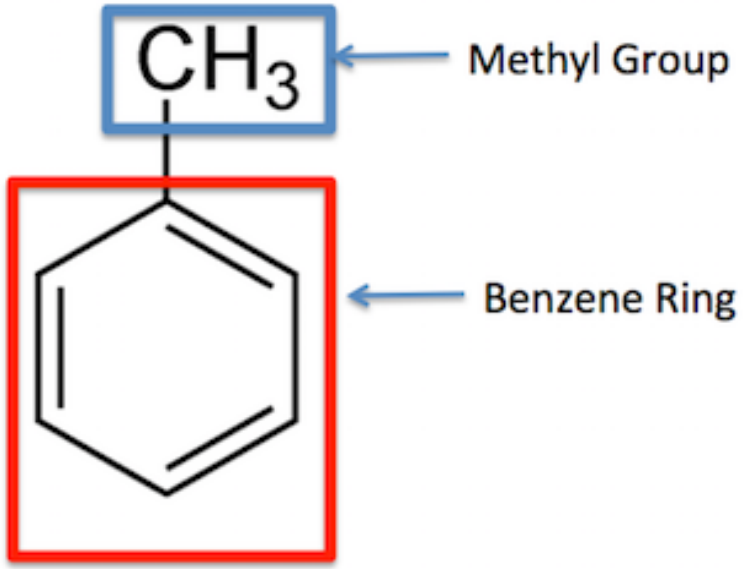
- Aromatic hydrocarbons include benzene, toluene, ethyl benzene, xylene.
- Charateristics:
  - All are very nonpolar
  - All are very unreactive
  - High boiling points
  - Low vapor pressures
  - Colorless
  - Dissolve in nonpolar solvents
  - Don't mix with water

Functional Groups and How It Makes The Compound Behave

A functional group gives a compound properties that is different than it otherwise would have. When adding a functional group to the compound, the polarity will change. The chemical properties and reactivity will also change.

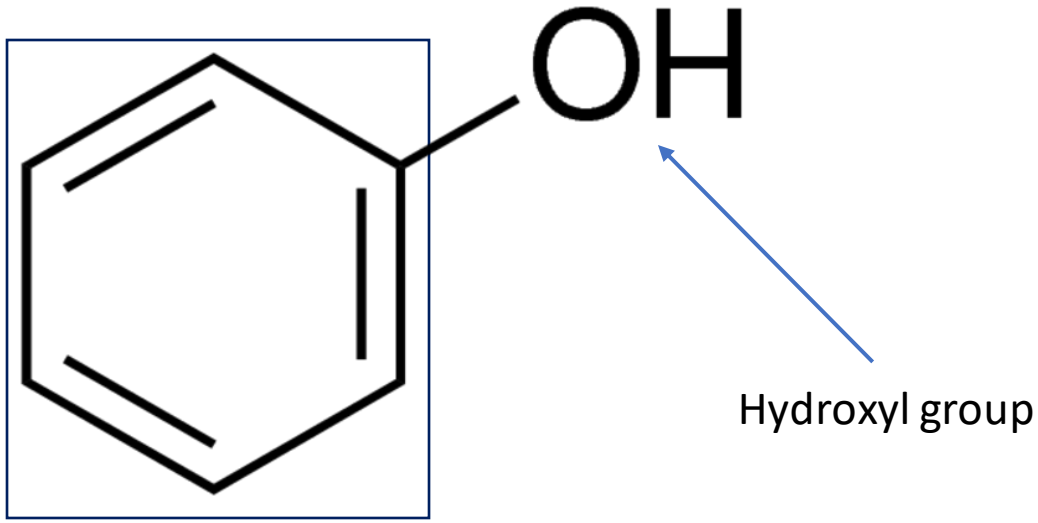
Toluene C_7H_8

- Clear, nonpolar, colorless liquid.
- Characteristic benzene odor.
- Insoluble in water –floats.
- Very stable and unreactive because of the benzene ring. (Benzene rings are characterized by stability.)



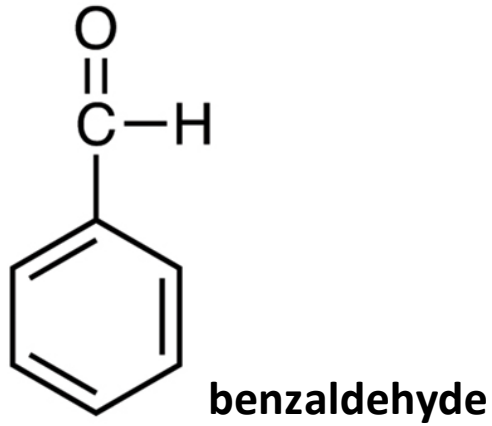
Phenol C_6H_6O

- White crystalline solid, strong disinfectant smell.
- Much more polar than Toluene (reason why its solid)
- The oxygen is very electronegative pulling electrons out of the aromatic ring functional group.
- The OH group activates the aromatic ring making it susceptible to chemical attack.
- Phenols are slightly acidic because of the OH group, while Toluene is neutral.

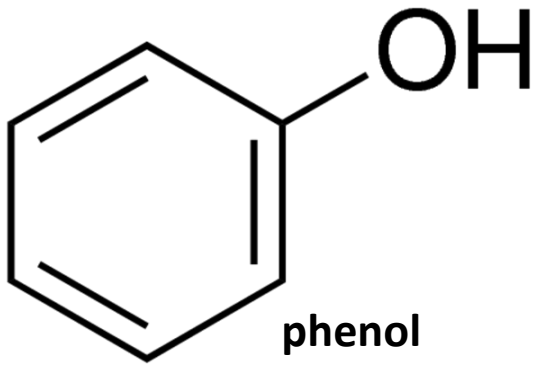


-Hypothesize- How and why aromatic hydrocarbons would behave differently with a different functional group

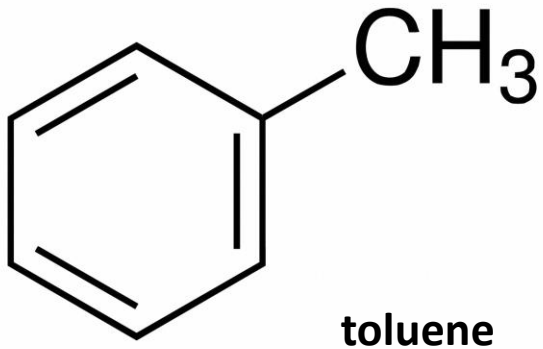
- If other functional groups such as aldehyde, hydroxyl, methyl groups, etc. are present on the benzene ring, the compound is a substituted benzene, and these substituted benzenes will have chemical properties of both the benzene ring and of the functional group. The functional group will determine how the substituted benzene reacts.
- For example, the benzaldehyde group contains benzene and the aldehyde functional group, so benzaldehyde will have properties of both benzene and aldehyde.
- The presence of the hydroxyl group will have more properties of an alcohol along with the properties of benzene.
- Toluene or methyl benzene has a methyl group. Since the methyl group is easily oxidized, it will be removed from the system easily, making it less carcinogenic than benzene.



benzaldehyde



phenol



toluene

5 question quiz + answers

1. True or False?

Aromatic hydrocarbons are a class of unsaturated hydrocarbons, which have one or more planar six-carbon rings called benzene rings, to which hydrogen atoms are attached.

Answer: True

2. True or False?

Two long-term effects of being exposed to aromatic hydrocarbons are jaundice and cataracts.

Answer: True

3. True or False?

Three examples of aromatic hydrocarbons are benzene, xylene, and toluene

Answer: True

4. True or False?

Hydroxyl groups will not be a functional group on an aromatic hydrocarbon

Answer: False

5. True or False?

The molecular formula of aromatic hydrocarbons is **C4r+2H2r+3**

Answer: False (C4r+2H2r+4)

Work Cited

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