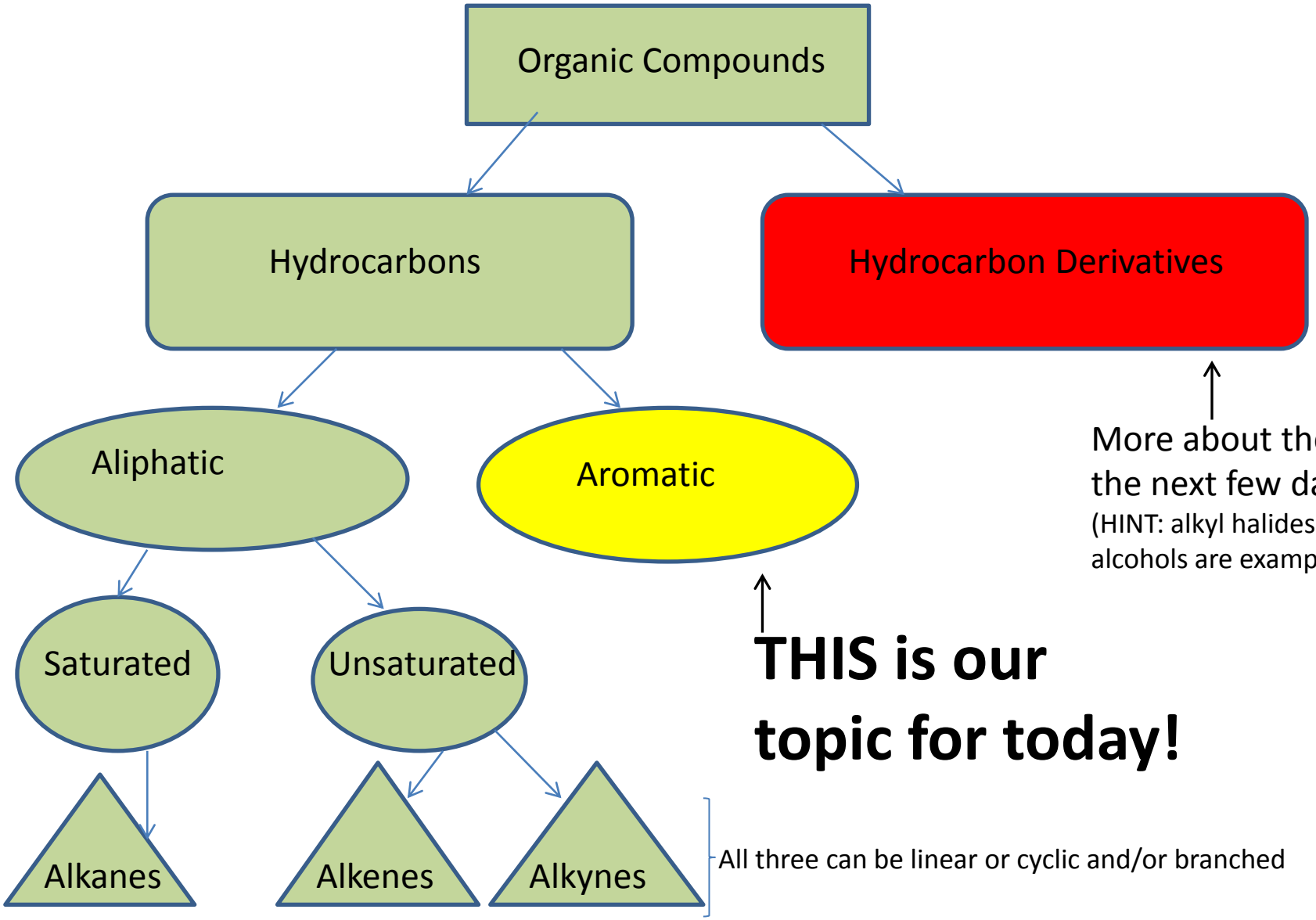
Aromatic Hydrocarbons

Chapter 1.3

Here's the story so far...



More about these in the next few days...
(HINT: alkyl halides and alcohols are examples)

THIS is our topic for today!

Aromatic Hydrocarbons

- An **aromatic hydrocarbon** is an unsaturated cyclic hydrocarbon with a pattern of bonding that makes it chemically stable
- **Benzene** is the simplest aromatic hydrocarbon
- Benxene is often depicted as a 6-carbon ring with alternating single and double bonds, however measurements of bond length indicate that all six bonds are equal and that bonding electrons are shared equally between the six carbons

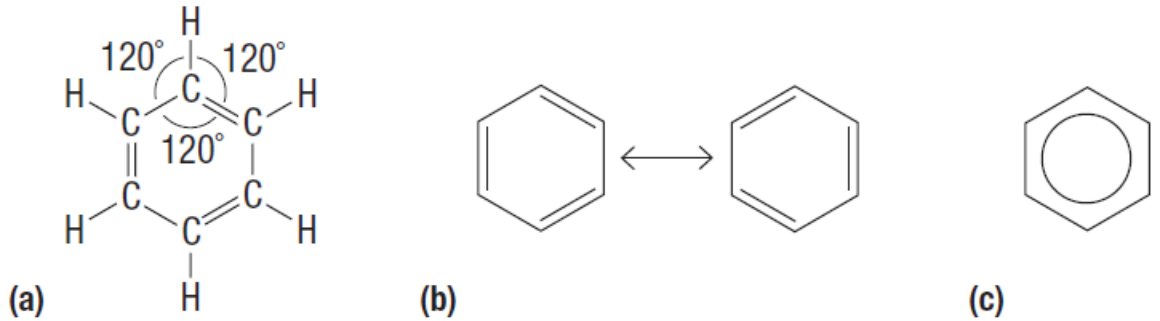
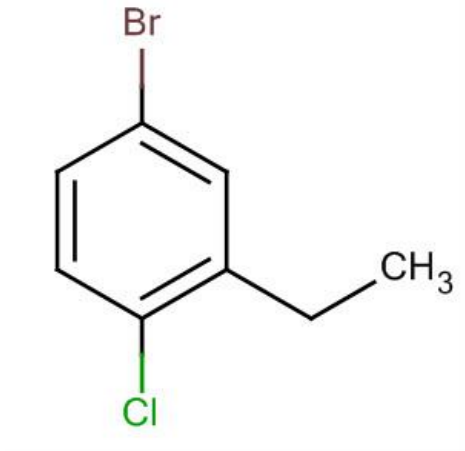


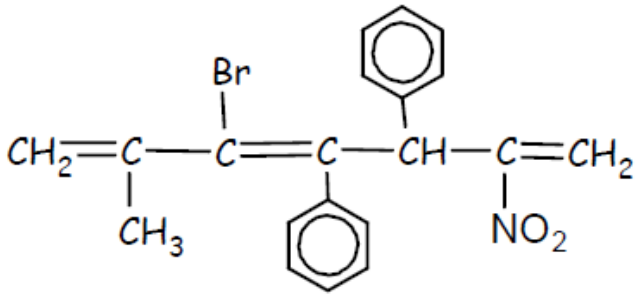
Figure 2 (a) The structure of benzene, a planar ring system in which all bond angles are 120° (b) Two structural formulas implying that the structure of benzene is a combination of them both together (c) The common representation of benzene

Naming Aromatic Hydrocarbons

- There are two conventions for naming aromatic hydrocarbons:

1) Naming benzene as the parent molecule
2) Naming benzene as a substituent group

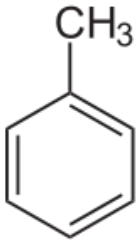




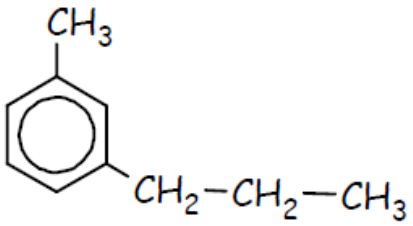
Naming Aromatic Hydrocarbons

1) Naming benzene as the parent molecule

- use the suffix *–benzene*
- example



- If there are multiple branches, number the carbon atoms of the benzene ring so that the branches have the lowest numbers possible
- example



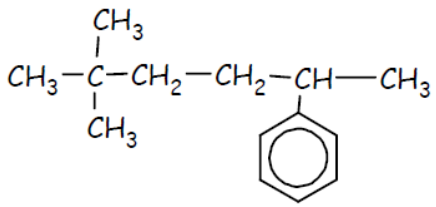
Naming Aromatic Hydrocarbons

2) Naming benzene as a substituent group

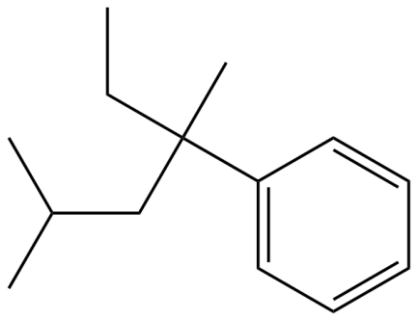
- Use the name *phenyl-* to indicate a benzene branch

- Examples

a)

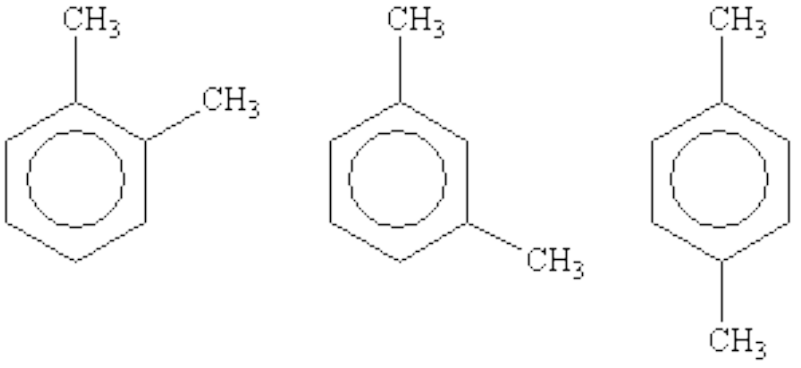


b)



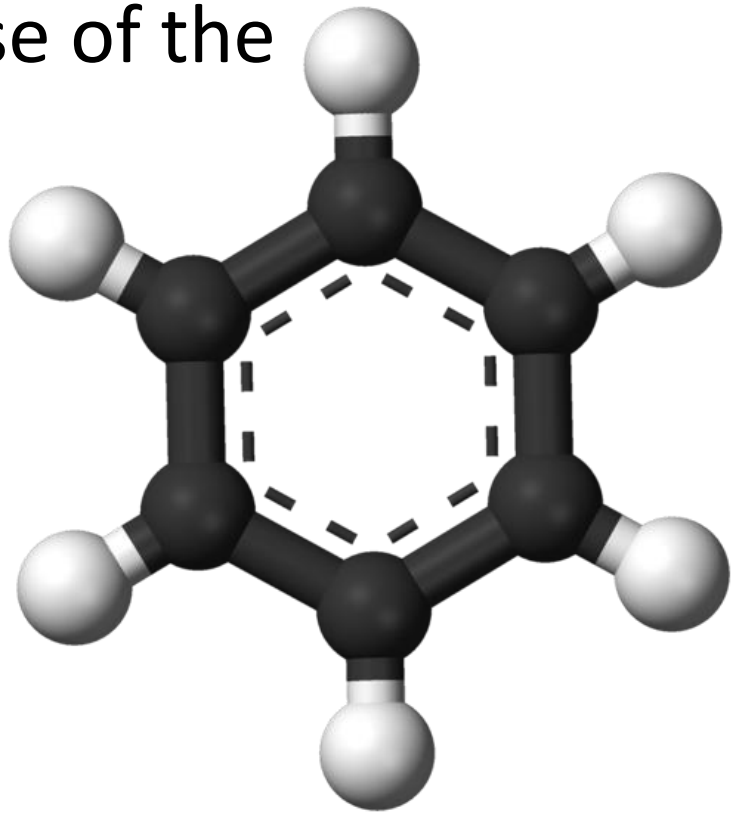
Old School Naming System

- Sometimes you will see the greek prefixes *ortho-*, *meta-*, and *para-* used to represent the 1,2 position, 1,3 position, and 1,4 positions on the benzene ring respectively



Properties of Aromatic Hydrocarbons

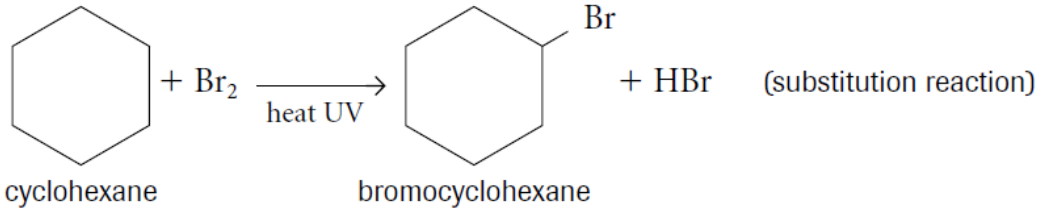
- Some are liquids at room temperature while others are crystalline solids
- Most are non-polar because of the symmetrical shape
- Insoluble in water
- Volatile
- Carcinogenic



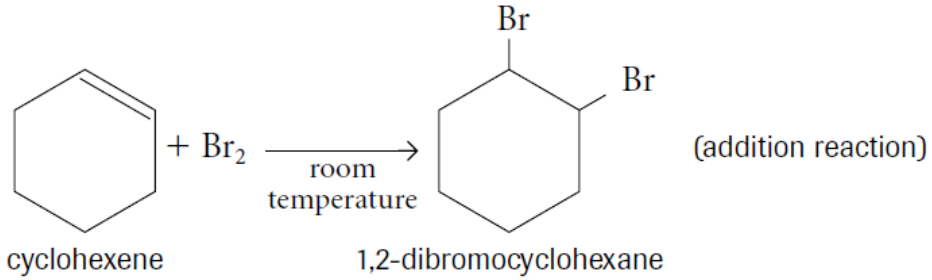
Reactions of Aromatic Compounds

So far we know this about **halogenation**:

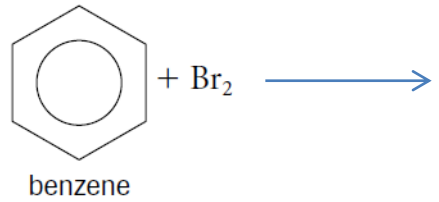
Alkanes react with halogens in a **substitution** reaction:



Alkenes and alkynes react with halogens in an **addition reaction**:



How will *aromatic compounds* react with halogens?



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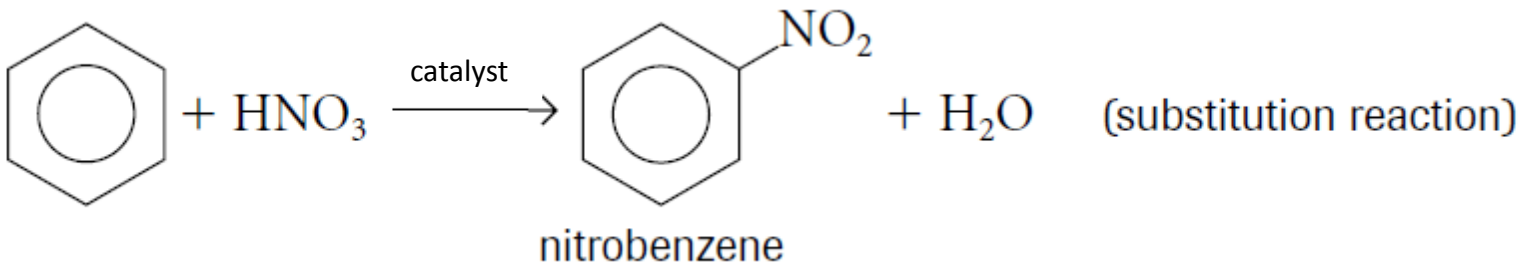
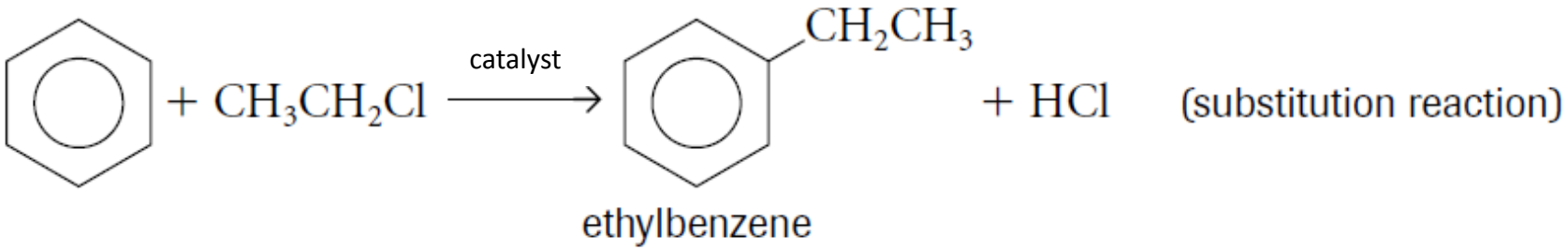
Reactions of Aromatic Compounds

Aromatics also undergo **substitution** reactions with nitric acid



Reactions of Aromatic Compounds

- Aromatics undergo **substitution** reactions with alkyl halides as well



HOMEWORK

Required Reading:

p. 28-31

Questions:

p. 30 #1-2

p. 31 #1-6

1858: Kekulé, moments before his inspirational insight into the structure of benzene.