

# **Aromatic – Aliphatic compounds (Arenes)**

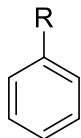
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**1<sup>st</sup> Semester**

**College of Pharmacy, Al-Farahidi University**

# AROMATIC – ALIPHATIC COMPOUNDS ( ARENES )

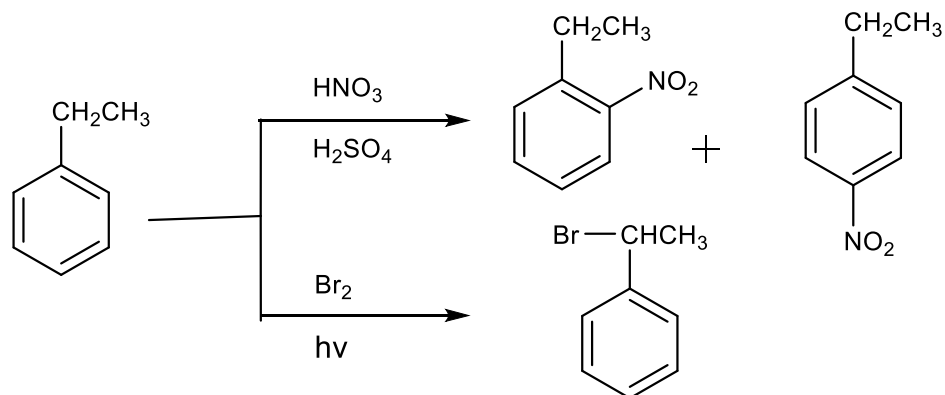
- The hydrocarbons which contain both aliphatic & aromatic units known as arene.



- R= alkyl, alkenyl, alkyl halide, alkyl alcohol, phenyl

## Chemical properties

- 1- The ring undergo the electrophilic substitution reaction and the side chain undergo free radical reaction

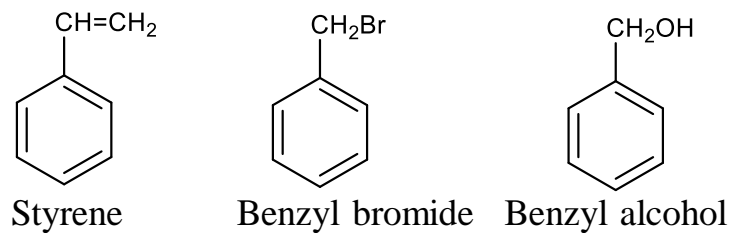
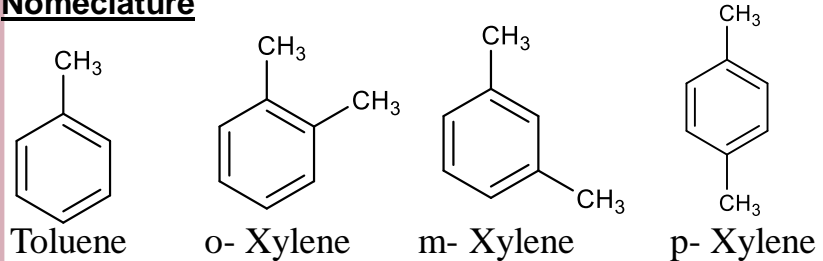


- 2. The properties of each portion of the molecule should be modified by the presence of the other portion

## Physical properties

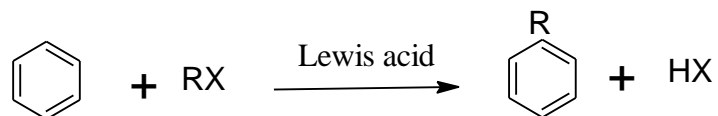
- Low polarity
- Insoluble in water
- Soluble in non polar solvent
- Less density than water
- Boiling point rise with increasing M.Wt.

## Nomeclature



## Preparation

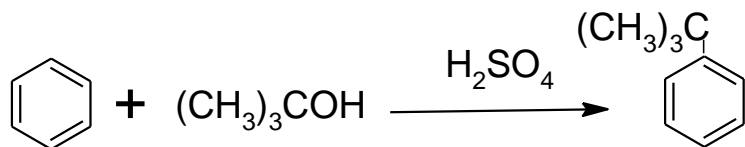
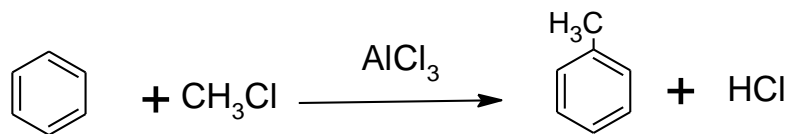
### •Friedel – Crafts alkylation

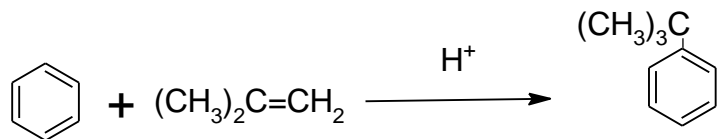
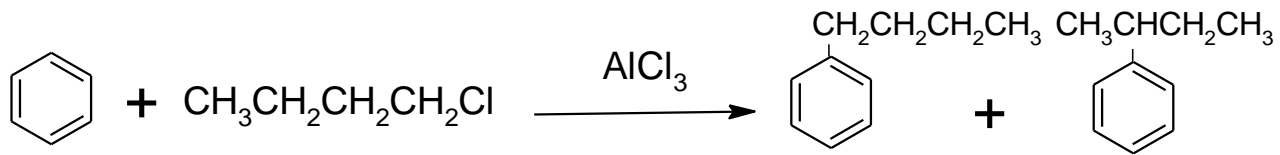


Lewis acid =  $\text{AlCl}_3$ ,  $\text{BF}_3$ ,  $\text{HF}$ ,  $\text{H}_3\text{PO}_4$ ,  $\text{FeX}_3$

X = Cl, Br, OH,  $\text{CH}_2=\text{CH}_2\text{R}$

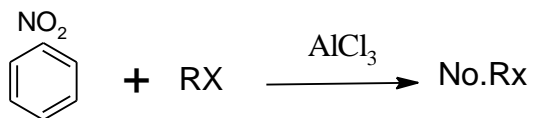
### Example



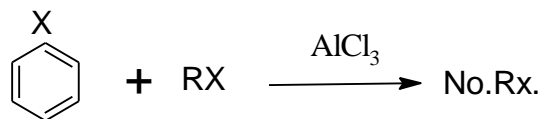


## Limitation of Friedel – Crafts alkylation

1.

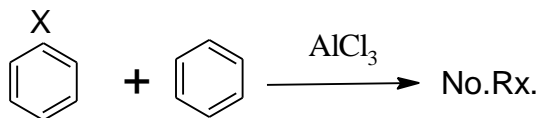


2.



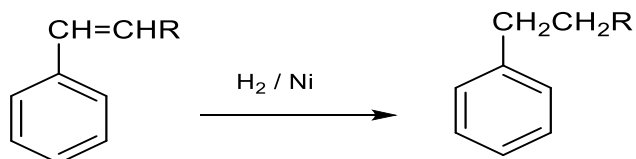
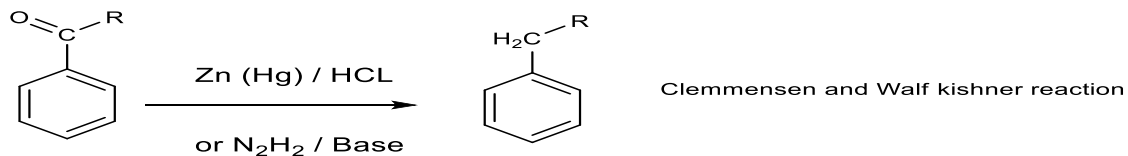
X = NH<sub>2</sub>, NHR, NR<sub>2</sub>

3.



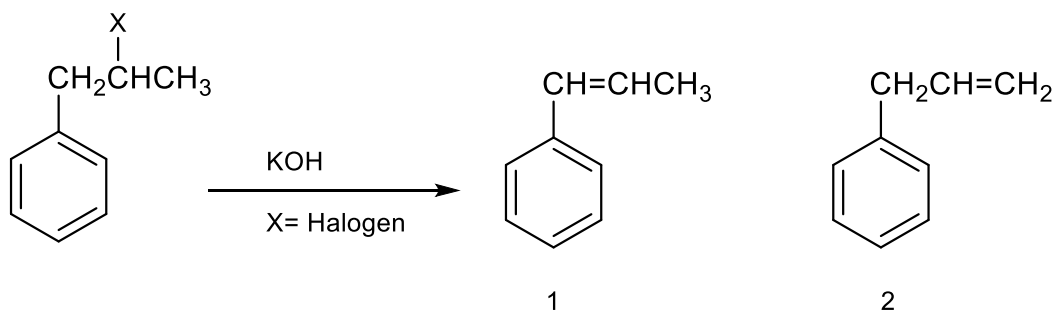
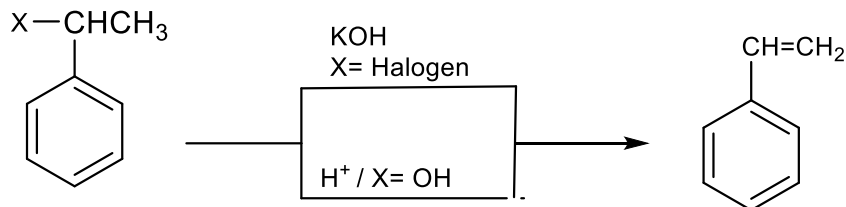
X = Halogen

### •Conversion of side chain

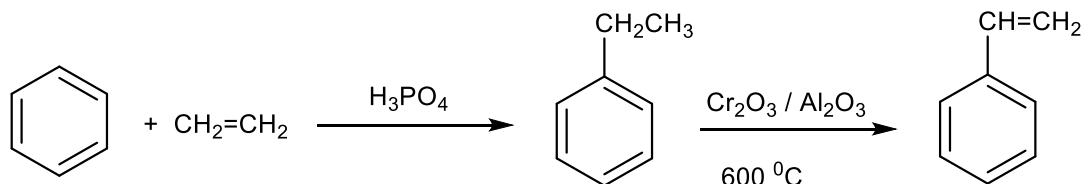


### Preparation of alkenylbenzene

The alkenylbenzene prepared by methods of 1,2-elimination like the preparation of alkenes.



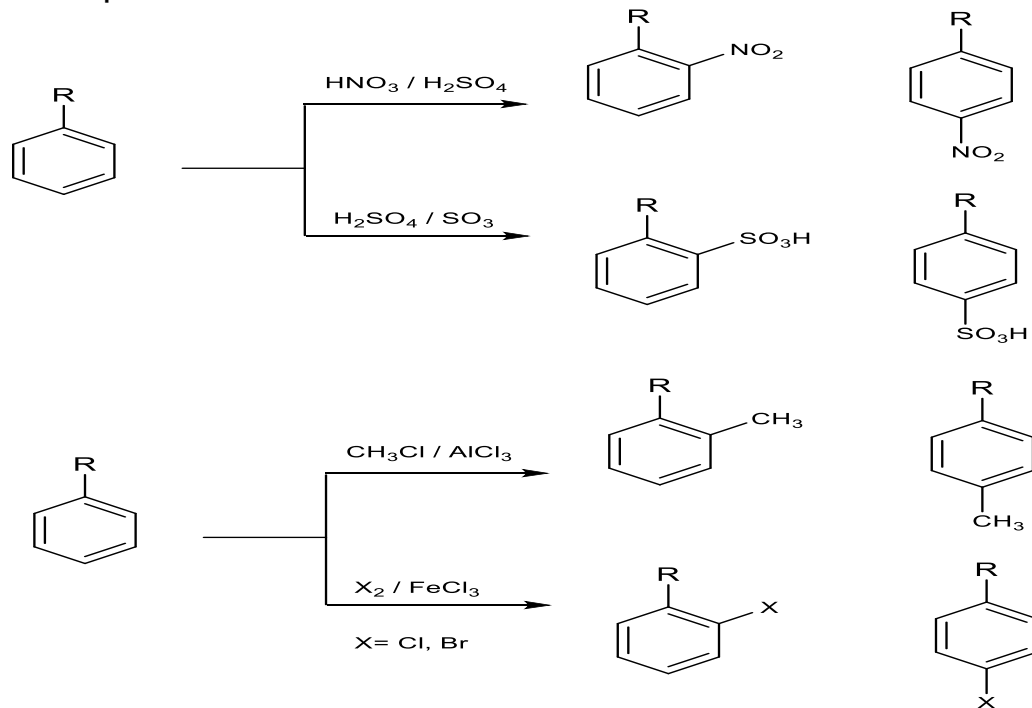
The product 1 is obtained because more stable than the product 2 and have double bond conjugated with ring; such conjugation confers unusual stability on a molecule.



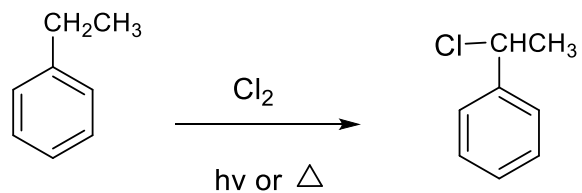
## Reaction of alkyl and alkenyl benzene

### A. Alkylbenzene

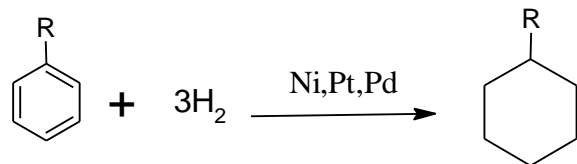
#### 1. Electrophilic aromatic substitution reaction



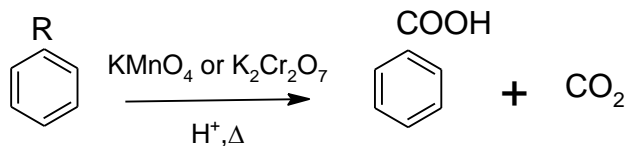
#### 2. Free radical substitution in the aliphatic side chain



#### 3. Hydrogenation



## 4. Oxidation

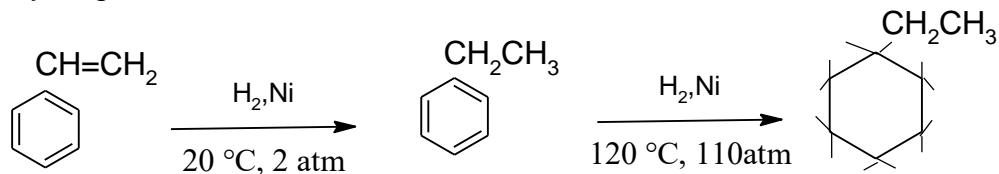


This reaction is used for two purposes:

- Synthesis of carboxylic acid
- Identification of alkylbenzene

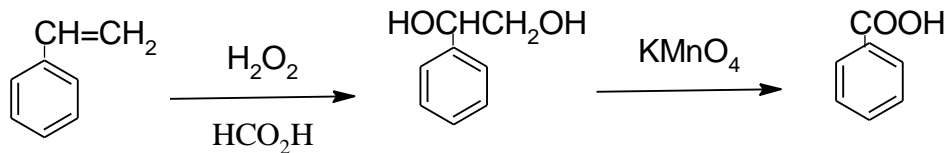
### **B. AlkenylBenzene reaction**

#### 1. Hydrogenation

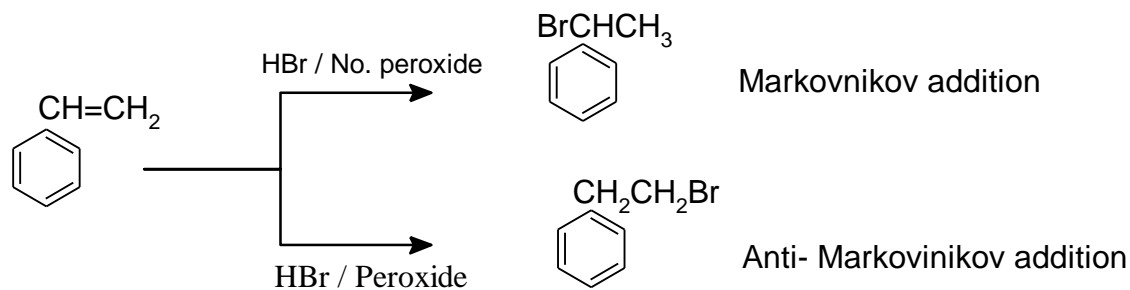


The conditions required for the hydrogenation of a double bond are much milder than those required for the hydrogenation of the ring, and this selection of conditions is quite easy to hydrogenate the side chain without touching the aromatic ring.

#### 2. Oxidation

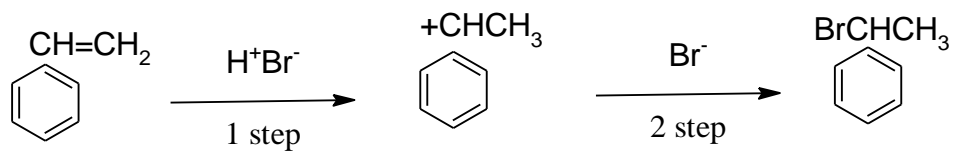


### 3. Addition of HBr



Mechanism

#### a. No peroxide



#### b. With peroxide

