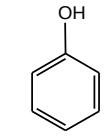
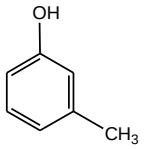
AROMATIC COMPOUNDS

1. Phenols

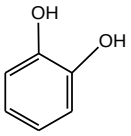
- Have general formula of Ar-OH.
- Different from alcohols.
- Can be mono, di or triphenols according to number of -OH.
- Extracted from coke by distillation.
- Have acidic character.



hydroxybenzene
phenol



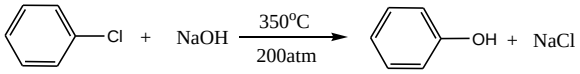
1-hydroxy-3-methylbenzene
cresol



1,2-dihydroxybenzene

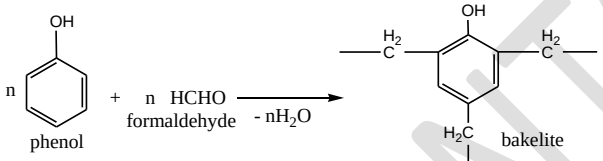
Phenol

- Colorless, crystalline solid, soluble in water.
- Poisonous substance, when contact with skin causes burns.
- Dilute phenol is used as antiseptics and disinfectants.
- Used as starting materials in the production of nylon, plastics, dye staffs, aspirin and antiseptics.
- Obtained from coke by distillation.
- In the laboratory it is prepared by following method.



chlorobenzene — phenol

- The most important reaction of phenol is its polymerization with formaldehyde, which produces bakelite.



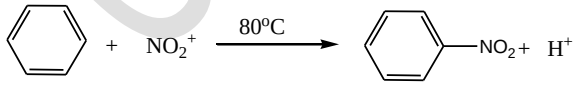
phenol

Bakalite

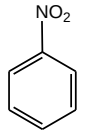
- Formed by the reaction under heat and pressure of phenol and formaldehyde, developed in 1907–1909 by Belgian Dr. Leo Baekeland.
- It was used for its electrically nonconductive and heat-resistant properties in radio and telephone casings and electrical insulators, and was also used in such diverse products as kitchenware, jewelers, pipe stems, and children's toys.

2. Aromatic Nitro Compounds

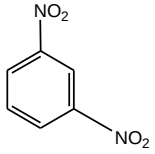
- Aromatic compounds with $-NO_2$ group(s).
- $-NO_2$ group is meta director.
- Addition of nitro group to benzene ring requires strong acid.



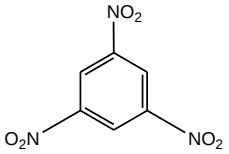
benzene — nitro benzene



mononitrobenzene



1,3-dinitrobenzene
m-dinitrobenzene



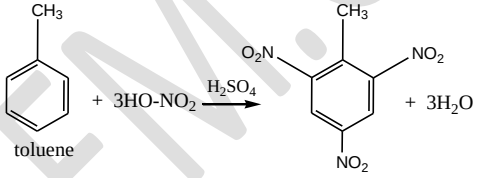
1,3,5-trinonitrobenzene

Nitrobenzene

- Nitrobenzene is yellow, oily liquid with a almond smell.
- Its vapor is poisonous, and carcinogen.
- Denser than water and insoluble.
- It does not react with acids and bases.
- It can be reduced to aniline with catalyst of Fe, Sn or Zn in acidic medium.
- It is used in dye industry, polishes, leather dressings, and in pharmacy.

Trinitrotoluene, TNT

- It is easily obtained from nitration of toluene.

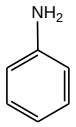


toluene — trinitrotoluene

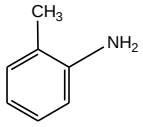
- It is crystalline solid, widely used as an explosive.

3. Aromatic Amino Compounds

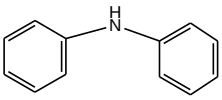
- They are produced from reduction of nitro compounds.
- They have pleasant odors, slightly soluble in water.



aminobenzene
aniline



2-aminotoluene
o-aminotoluene



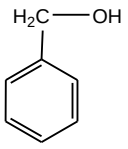
diphenylamine

Aniline

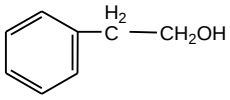
- It is first synthesized from indigo.
- It is colorless, has a smell of rotten fish and is poisonous.
- It is produced from the reduction of nitrobenzene.
- Compounds that have a hydroxyl group attached to a chain on a benzene ring are called aromatic alcohols.

4. Aromatic Alcohols

- Compounds that have a hydroxyl group attached to a chain on a benzene ring are called aromatic alcohols.



benzyl alcohol



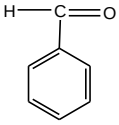
β-phenyl ethyl alcohol

Benzyl Alcohol

- It is the simplest member of the aromatic alcohols.
- It is colorless with a pleasant odor.
- It is slightly soluble in water, reacts with Na and K to produce H_2 gas.

5. Aromatic Aldehydes

- Compounds in which the aldehyde functional group is directly attached to the benzene ring.



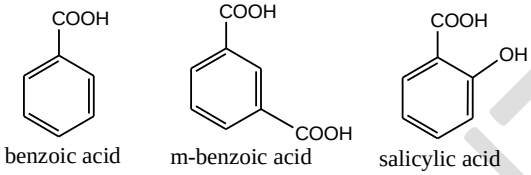
benzyl aldehyde

Benzyl Aldehyde

- It is colorless liquid and has a bitter almond taste and smell.
- It is found in seeds of almond, peach and plum.
- It dissolves in alcohol and ether, and slightly soluble in water.
- It can be produced from benzyl alcohol by oxidation.

6. Aromatic Carboxylic Acids

- Compounds in which one or more carboxyl group is attached to the benzene ring.



benzoic acid m-benzoic acid salicylic acid

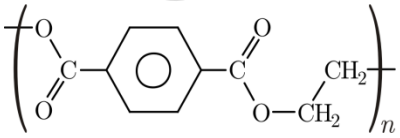
- They are colorless crystalline solids.
- They are slightly soluble in water.
- They are more acidic than aliphatic carboxylic acids.

Benzoic Acid

- It is prepared from toluene, ethyl benzene, isopropyl benzene, benzaldehyde, and acetophenone by oxidation method.
- Its salts are used as a food preservative.
- It is also used in medicine to prepare ointment.

Terephtalic Acid

- It is also known as paraphthalic acid or 1, 4 benzene dicarboxylic acid.
- It forms polymer with alcohols such as glycol, and is called Dacron, Terylene or Mylar. It is commonly known “PET”.



- It is commonly used for soft drink bottles.