

Aromatic Hydrocarbons

Benzene C_6H_6

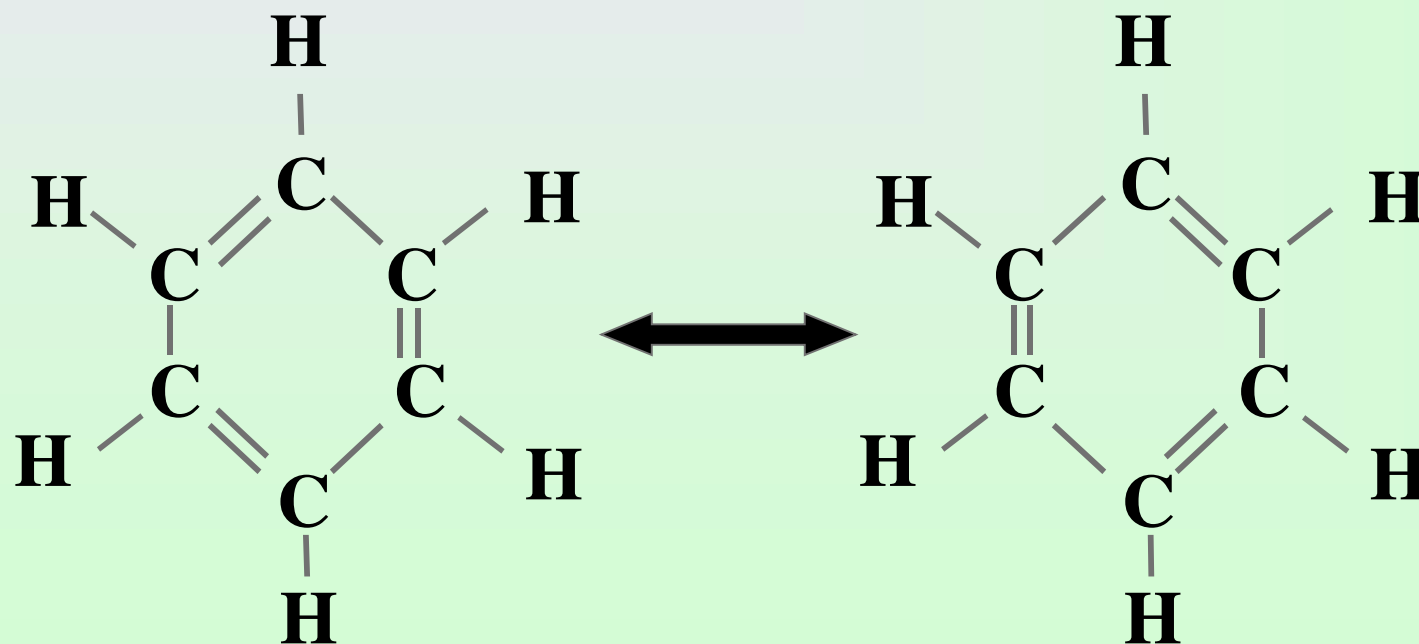
**due to benzene's high carbon to hydrogen ratio
it was assumed that it would undergo addition
reactions similar to that of alkenes and alkynes**

Benzene however proved to be relatively inert

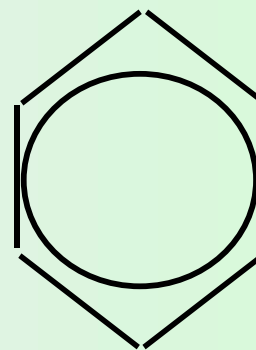
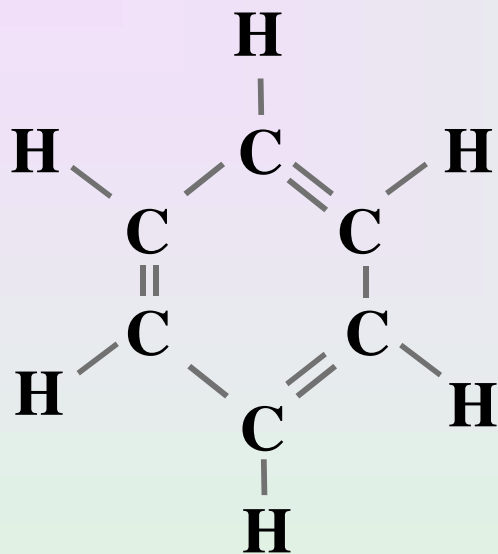
August Kekule

deduced the structure of benzene to be planar and cyclic

the properties of benzene can be explained by delocalized molecular orbitals

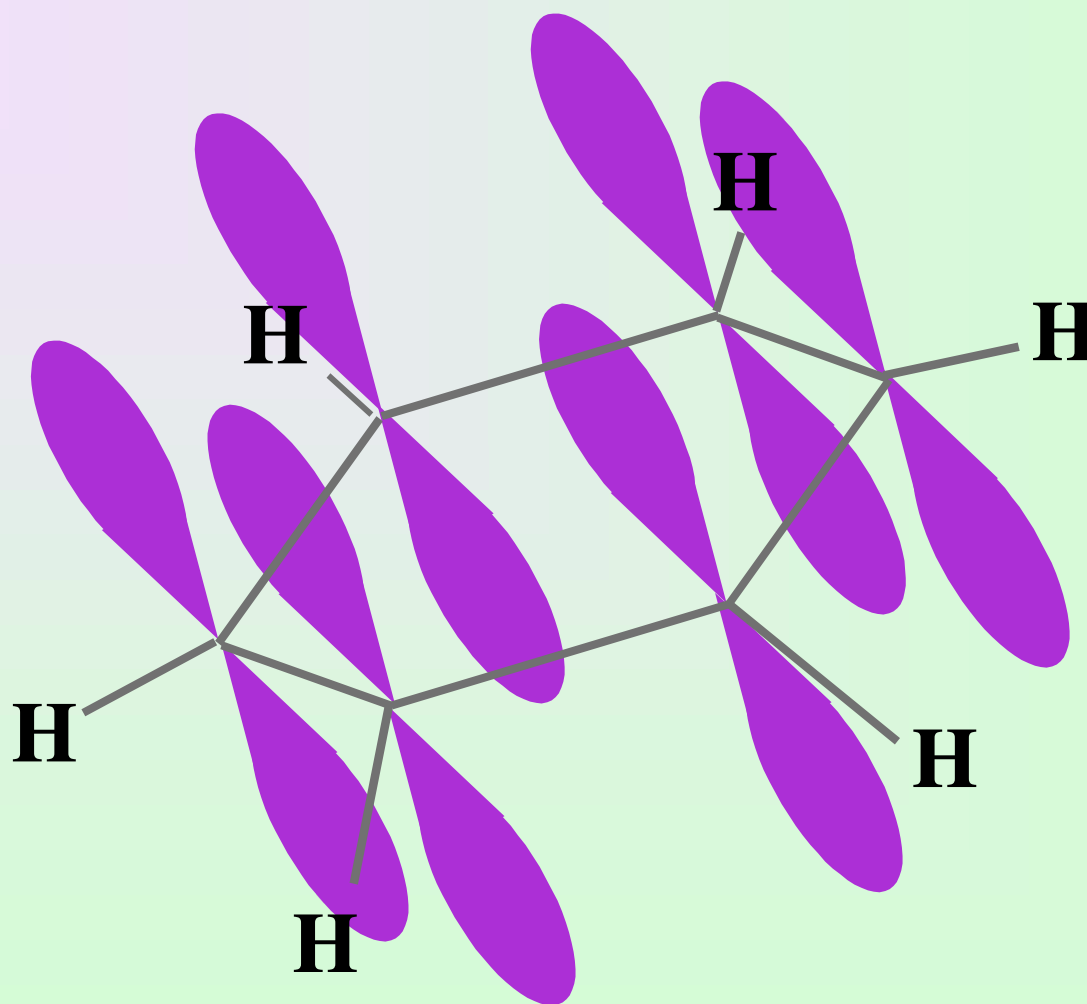


Benzene C_6H_6

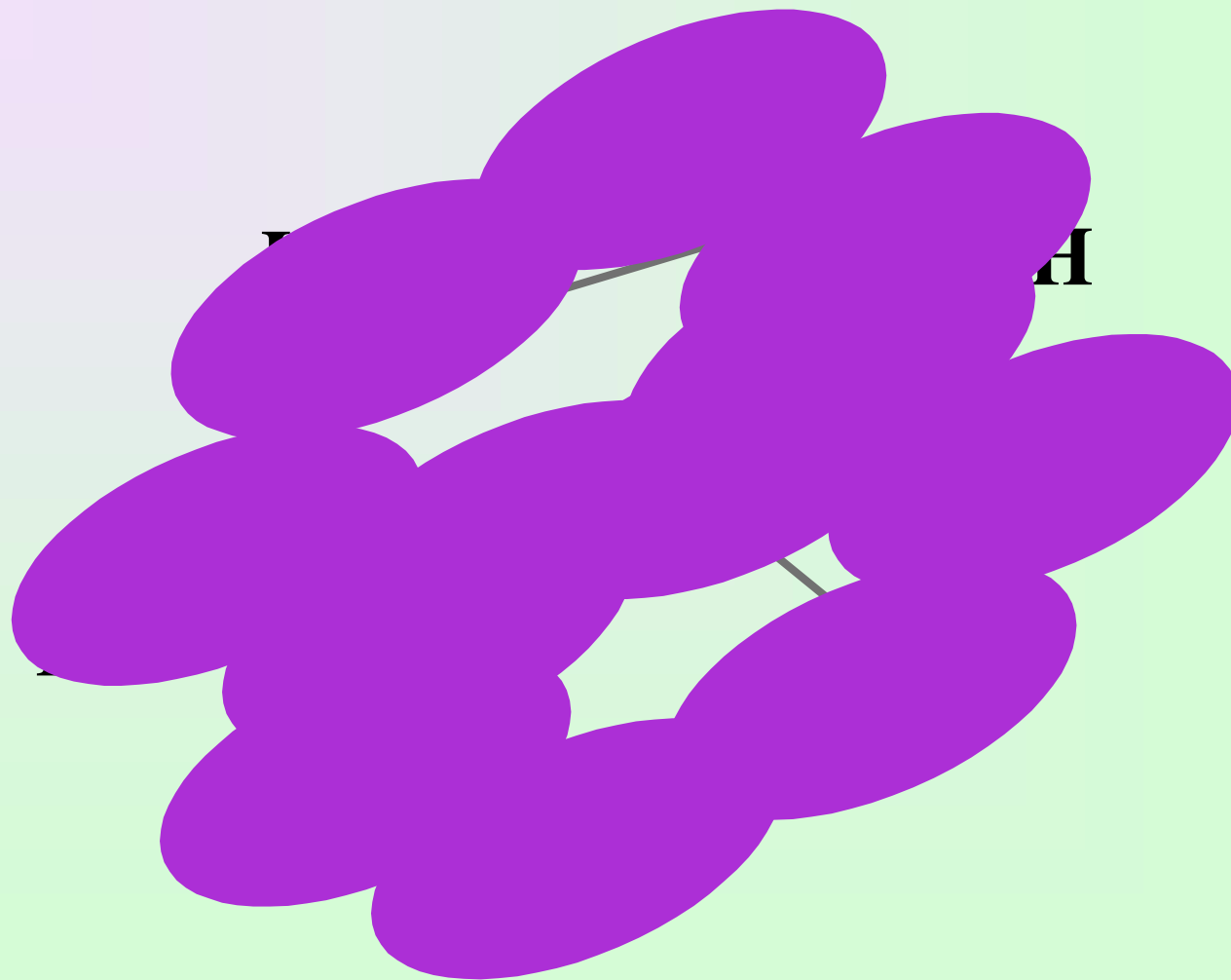


The circle represents the electrons in the π system.

Benzene C_6H_6

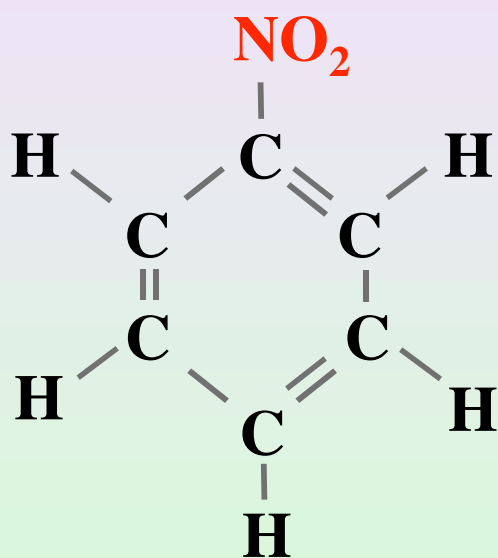


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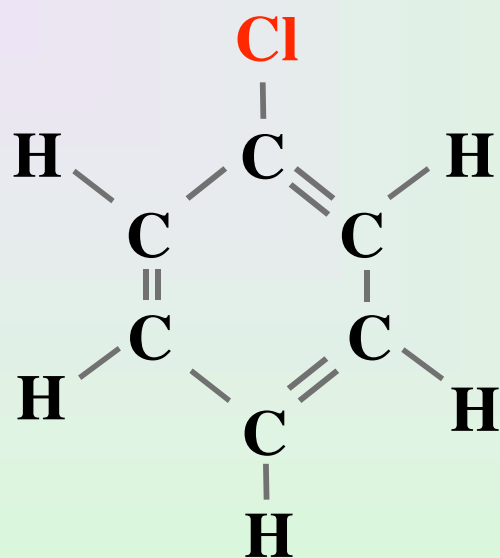


Nomenclature

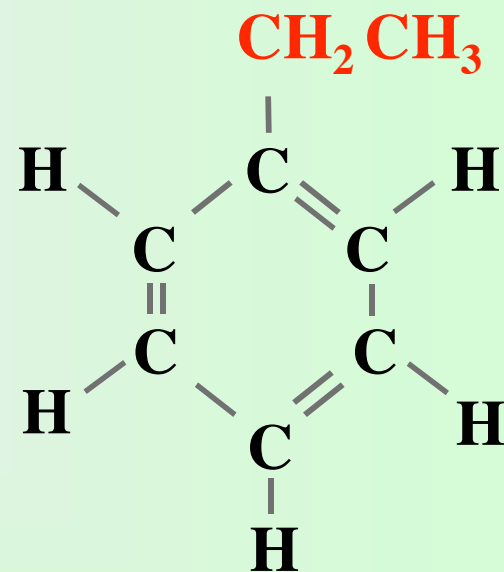
Naming of monosubstituted benzene



nitrobenzene



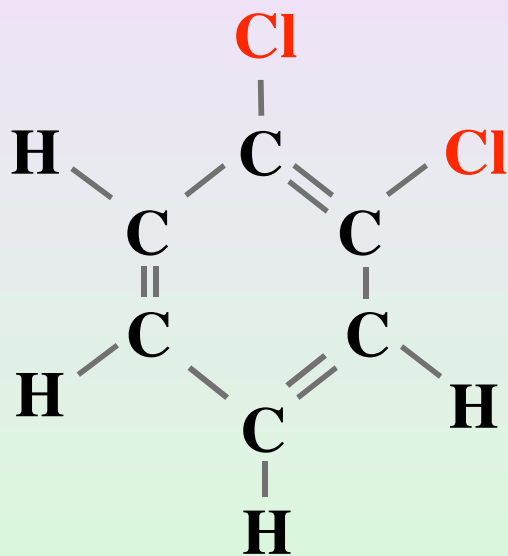
chlorobenzene



ethylbenzene

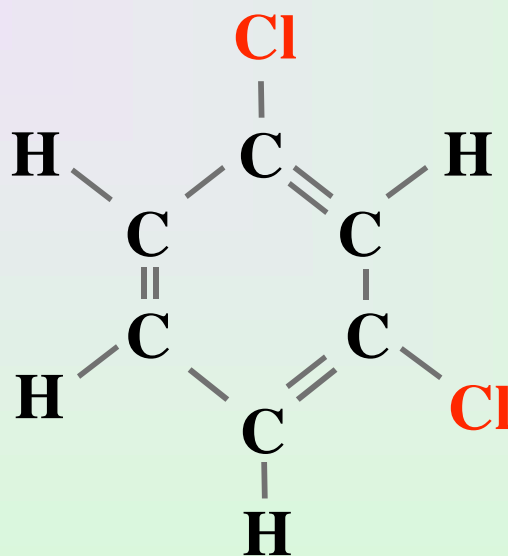
Nomenclature

If more than one substituent is present we must indicate the location of the second group relative to the first



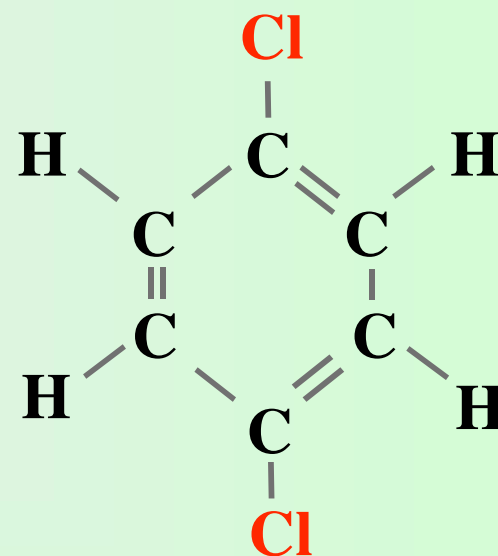
1,2-dichlorobenzene

ortho



1,3-dichlorobenzene

meta

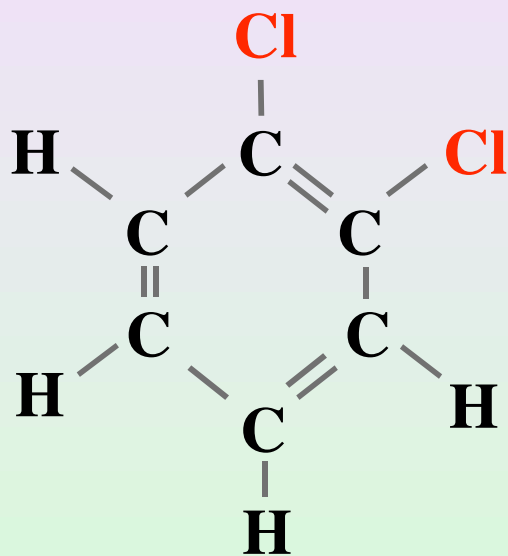


1,4-dichlorobenzene

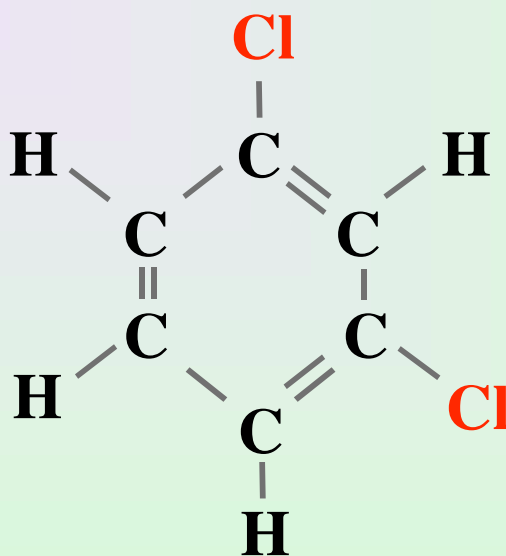
para

Nomenclature

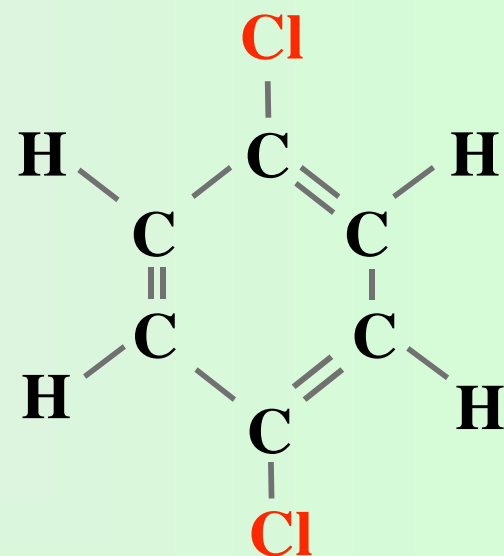
If more than one substituent is present we must indicate the location of the second group relative to the first



o-dichlorobenzene



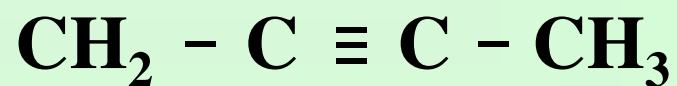
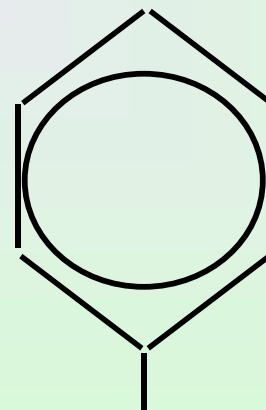
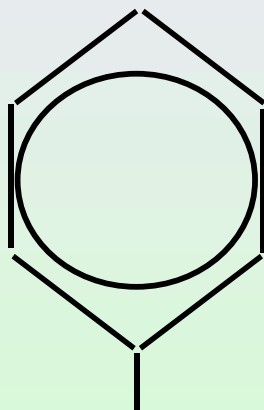
m-dichlorobenzene



p-dichlorobenzene

Benzene C_6H_6

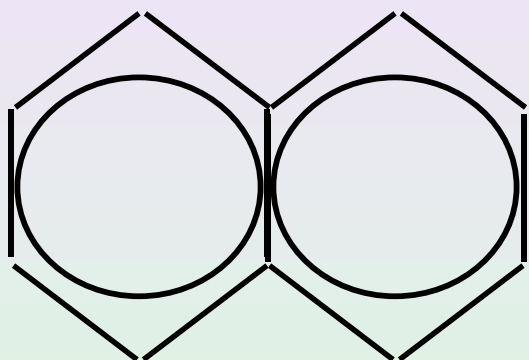
when benzene is used as a substituent, it is called the **phenyl Group**



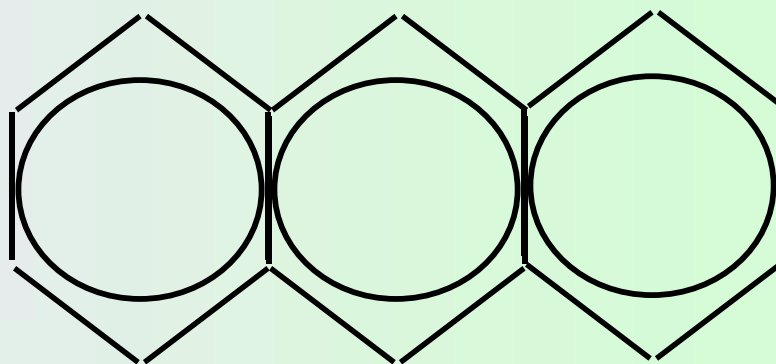
1-phenyl-2-butyne

Nomenclature

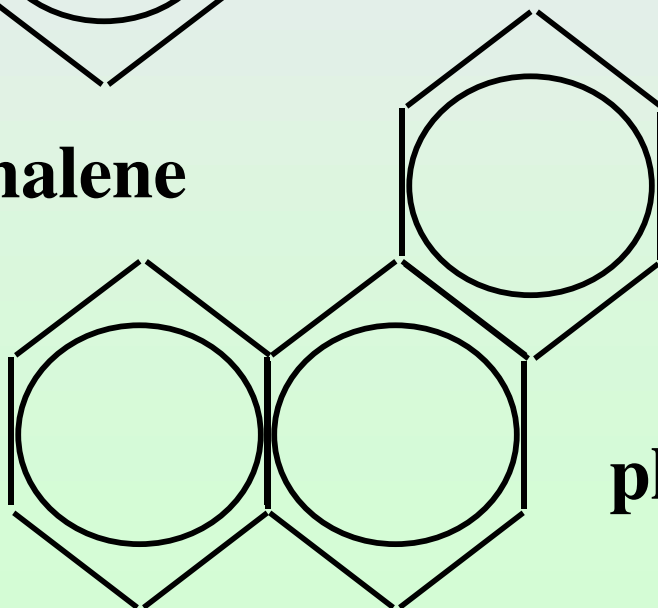
Any group that contains one or more fused benzene rings is called an **aryl group**



Naphthalene



Anthracene



phenanthrene

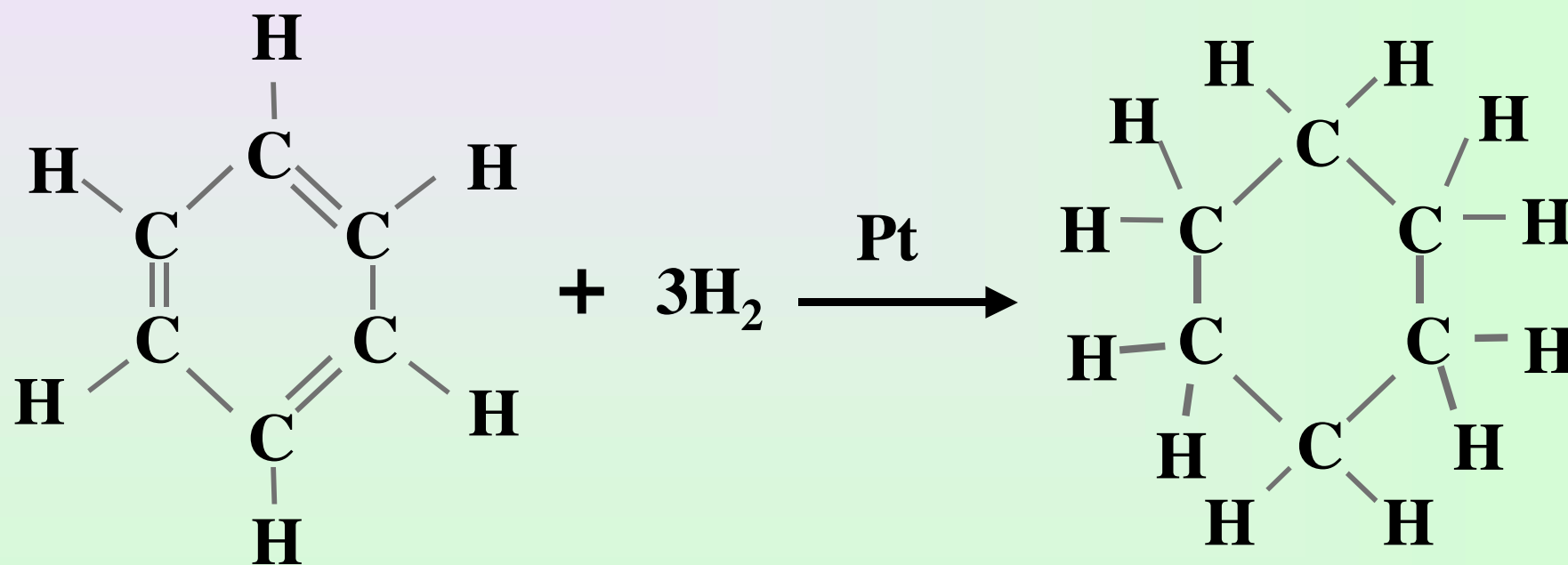
Chemical Reactions involving Aromatics

Addition reactions

hydrogenation

Chemical Reactions involving Aromatics

benzene can be hydrogenated with difficulty



Chemical Reactions involving Aromatics

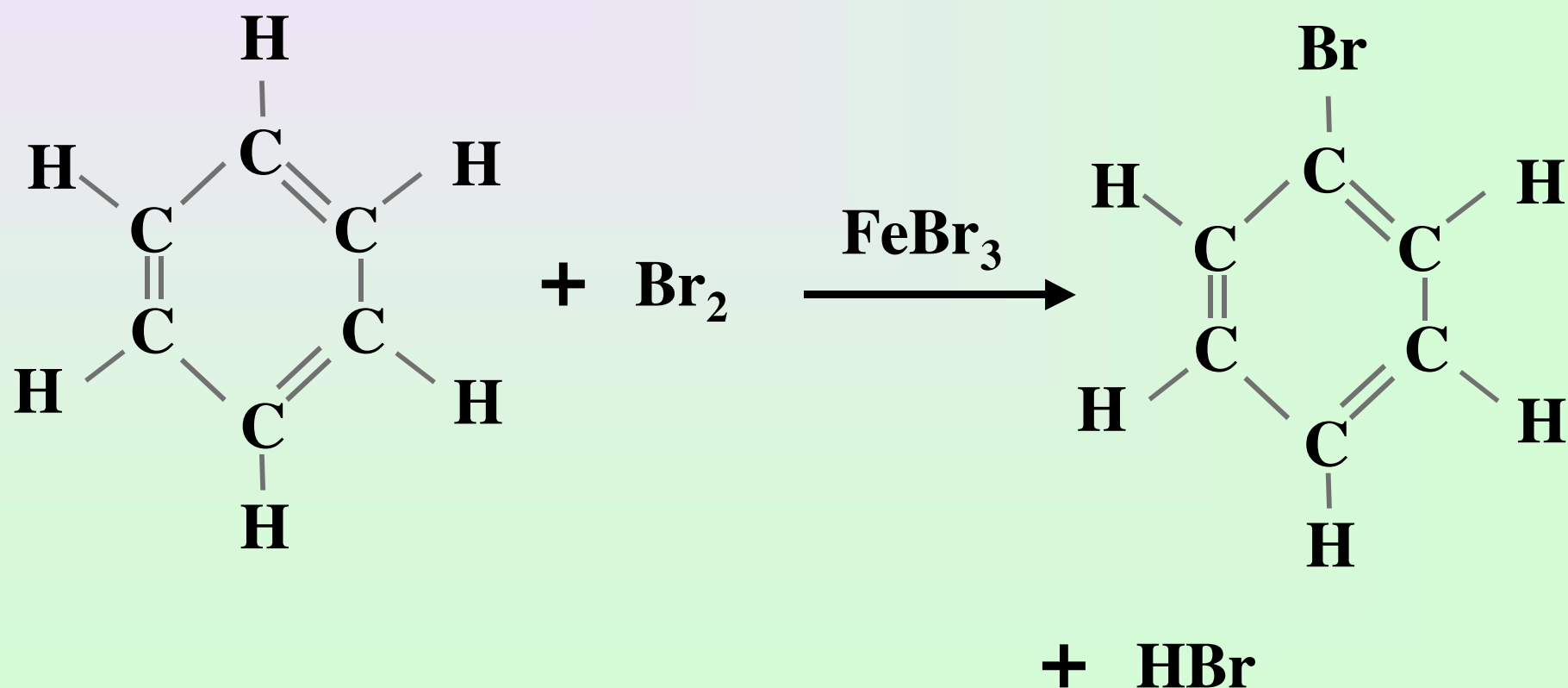
substitution reactions

with hydrogen halides

alkyl groups

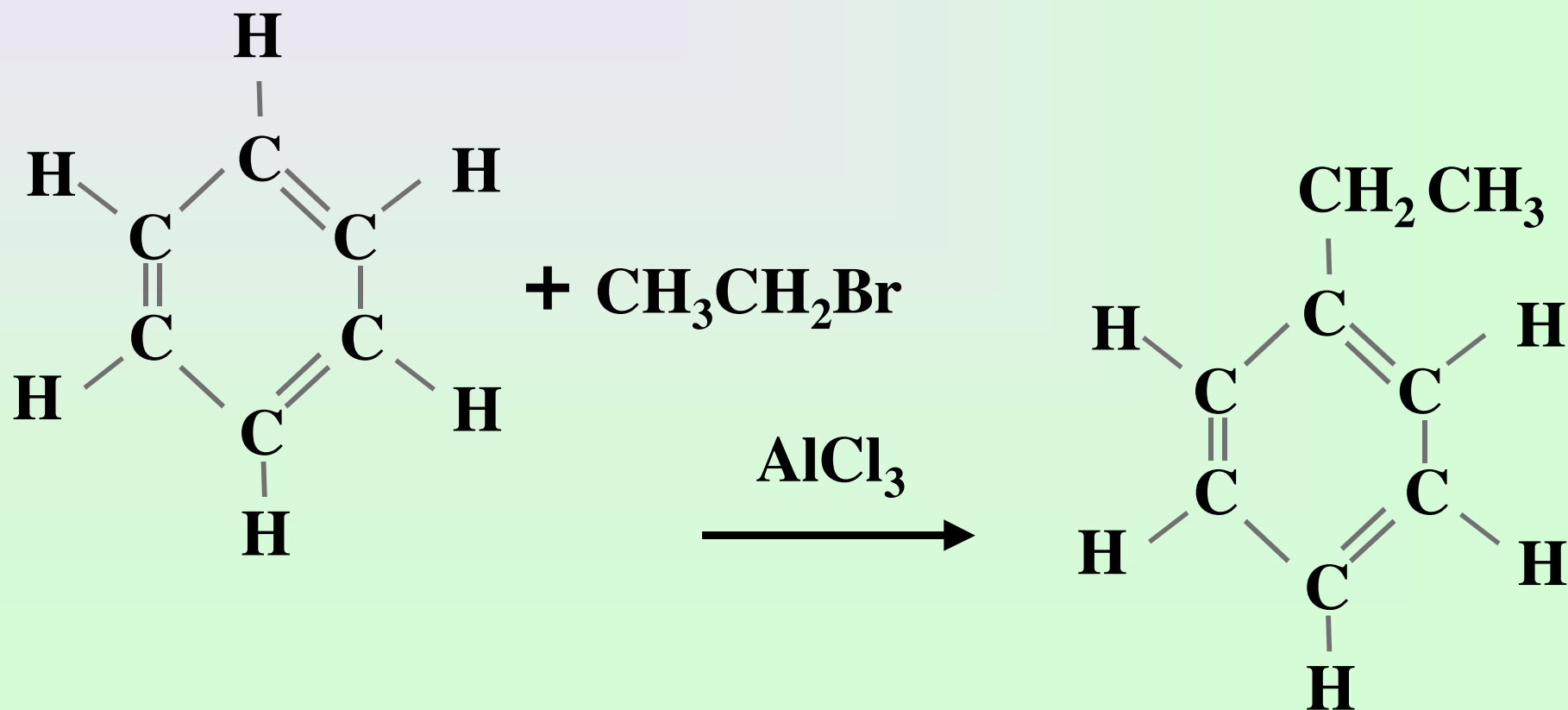
Chemical Reactions involving Aromatics

substitution of benzene with halogens using FeBr_3 as catalyst



Chemical Reactions involving Aromatics

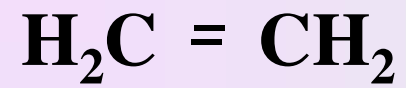
Alkyl groups can be introduced into the ring system by allowing benzene to react with an alkyl halide using AlCl_3 as a catalyst



Polymerization

Building large molecules (polymers) from small molecules (monomers).

ethylene



polyethylene

