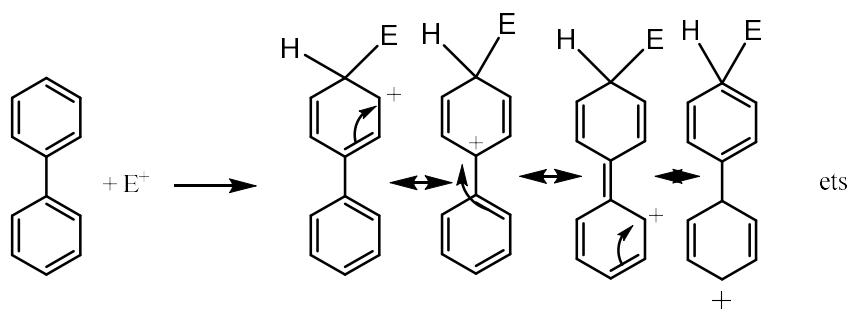
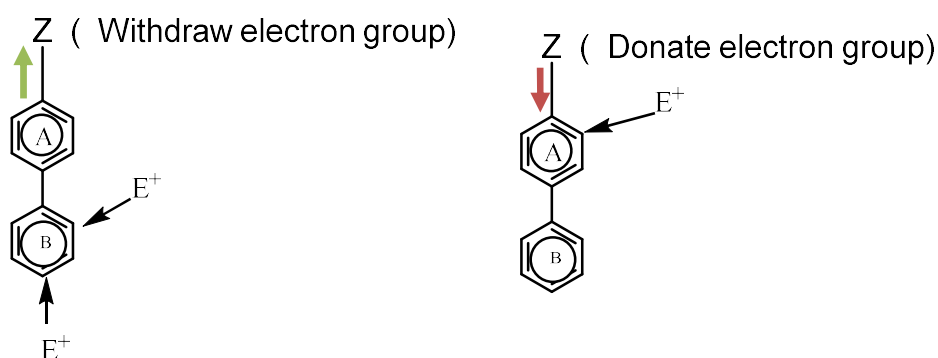
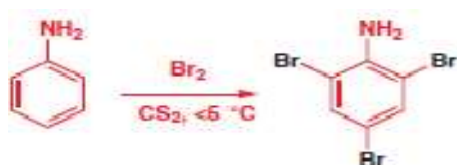
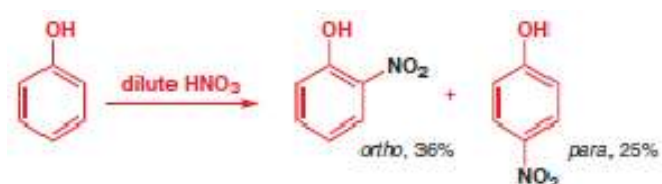
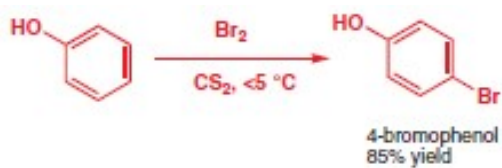
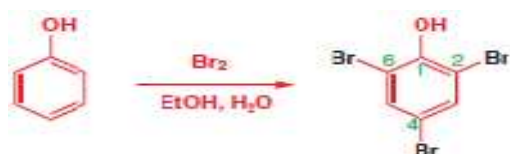
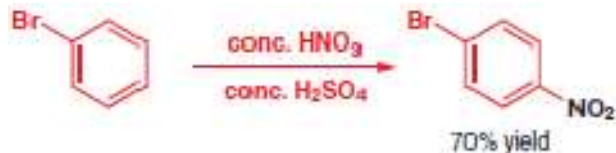
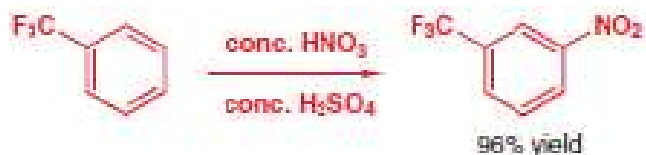


Effect of phenyl substitution on the aromatic ring: (*para*-substitution)

- Effect of withdrawing and donating group:

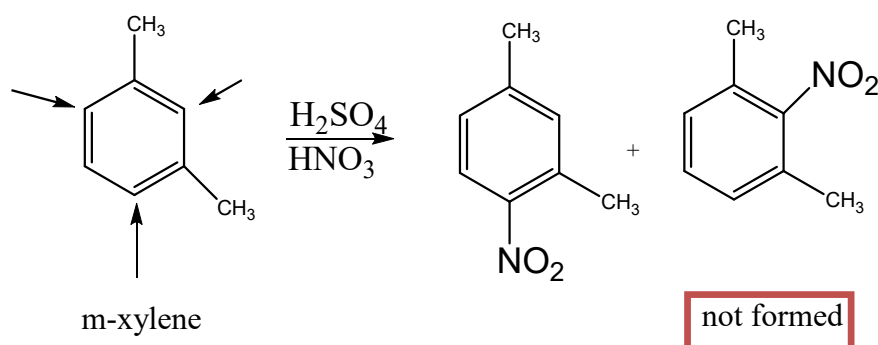
**Examples:**

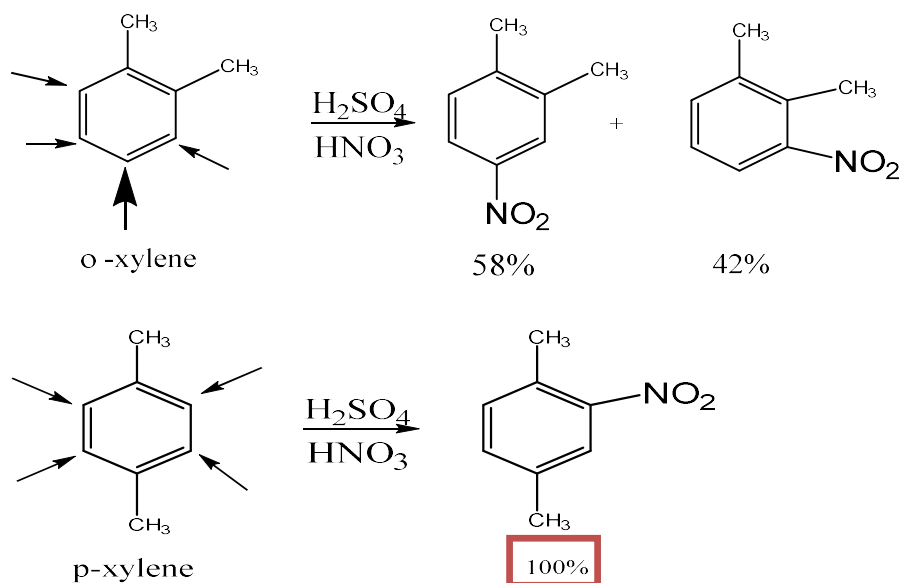


Electrophilic substitution of disubstituted benzene ring:

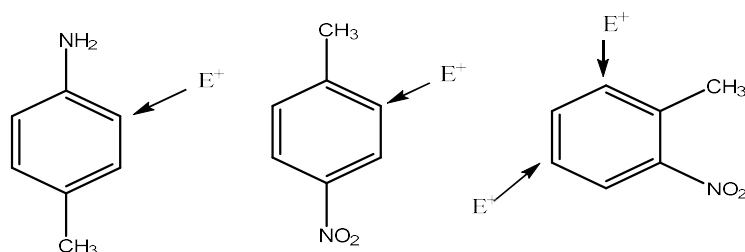
Two or more substituent produces a combine effect on the reactive of an aromatic ring.

a- Di donating groups:



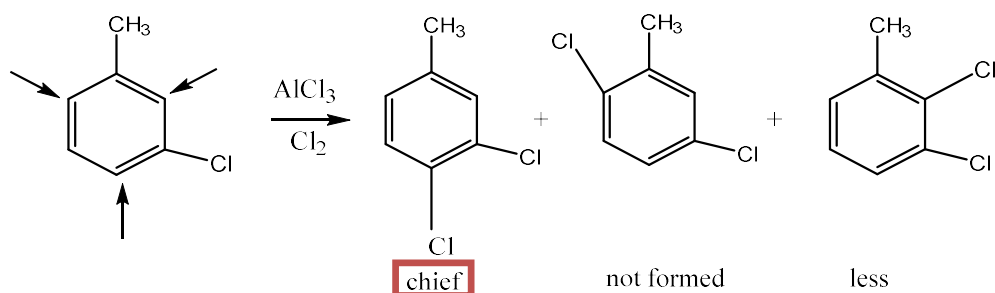


b- Donating and withdrawing groups:

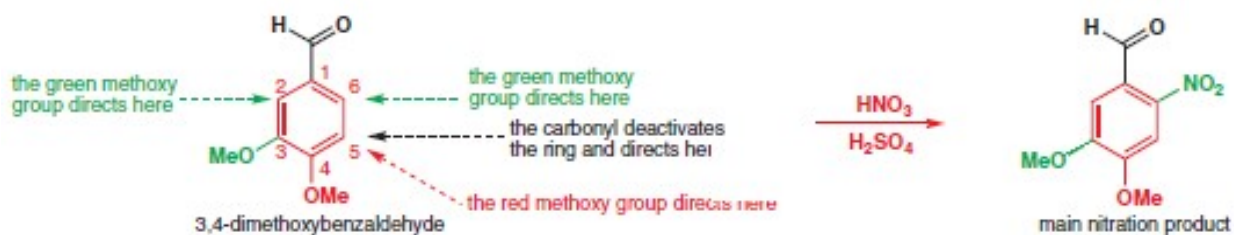


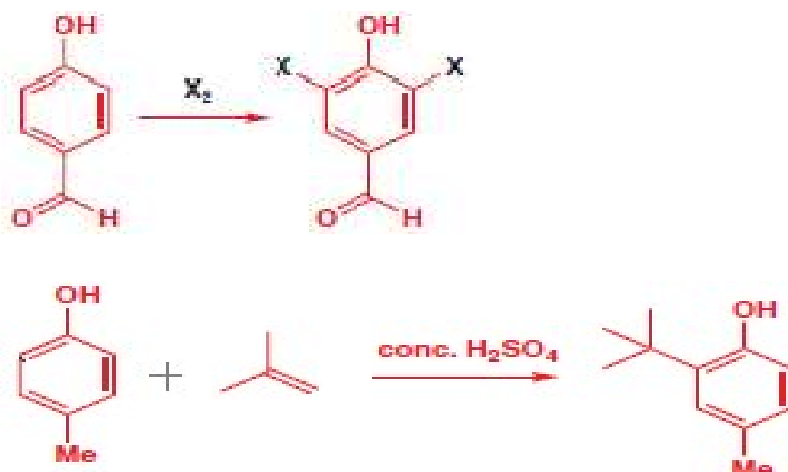
- The presence of groups substituted, one of them *meta* position and the other to be the one donate electrons and the other withdrawing electron shown here *ortho effect* for the group *withdrawing*.

Examples:

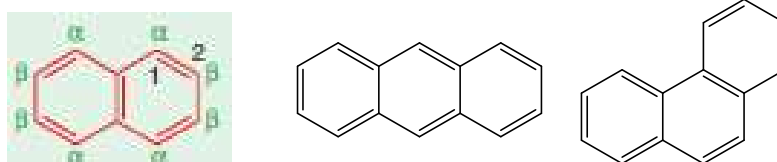


c- Di donating and withdrawing groups:

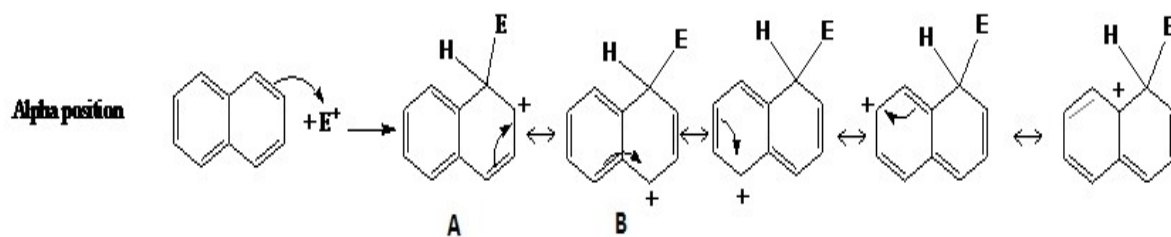


Examples:**Substitution reaction of polynuclear aromatic hydrocarbons:**

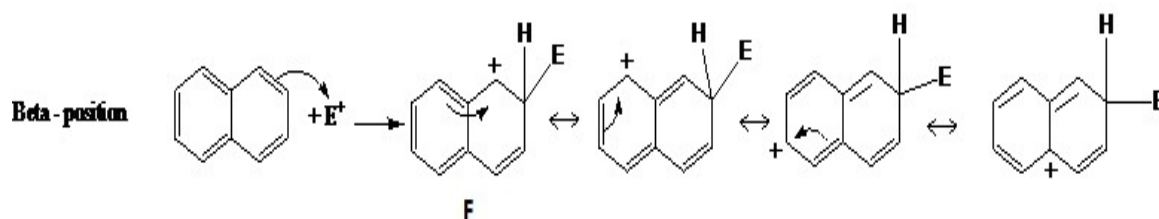
Although **naphthalene**, **phenanthrene** and **anthracene** resemble benzene in many respects, they are **more reactive** than benzene in both **substitution** and **addition reaction**.

**Orientation of naphthalene:**

Orientation in the substitution of naphthalene can be complex, although the **1- position** or **alpha position (α)** is the **more reactive**, substitution usually occurs **more** readily at the **1-position (alpha –position)** than at the **2-position (beta-position (β))** because the intermediate for **alpha-substitution is more stable than that the (beta –position)**. The reason in that the most favorable resonance structure for either intermediate is those that have one fully aromatic ring.

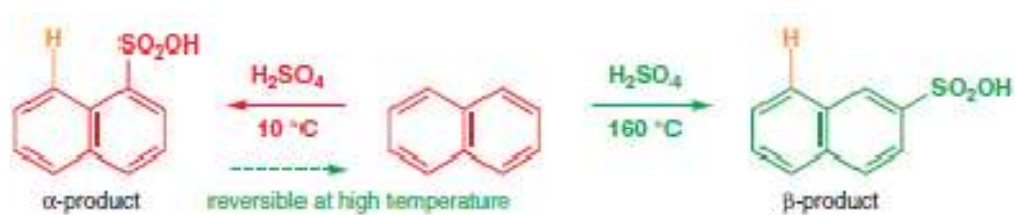


5 resonance structures. Two structures (A, B) have full benzene rings

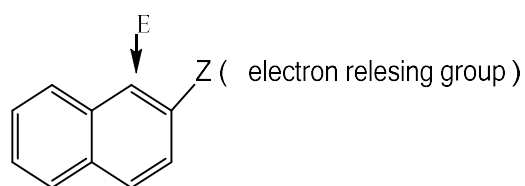
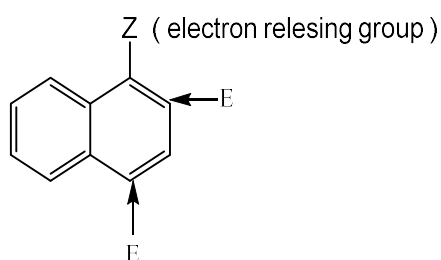


4 resonance structures. One structure (F) has full benzene ring

Example:



a- Di donating group:



b- Withdrawing group:

