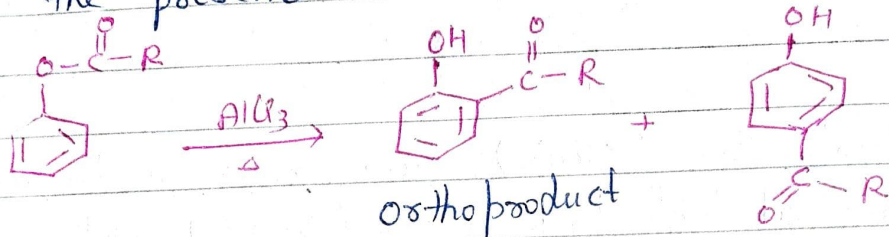


Fries Rearrangement:

It involves the migration of acyl group of phenol esters to the aryl ring in the presence of Lewis acid.

ring in the presence

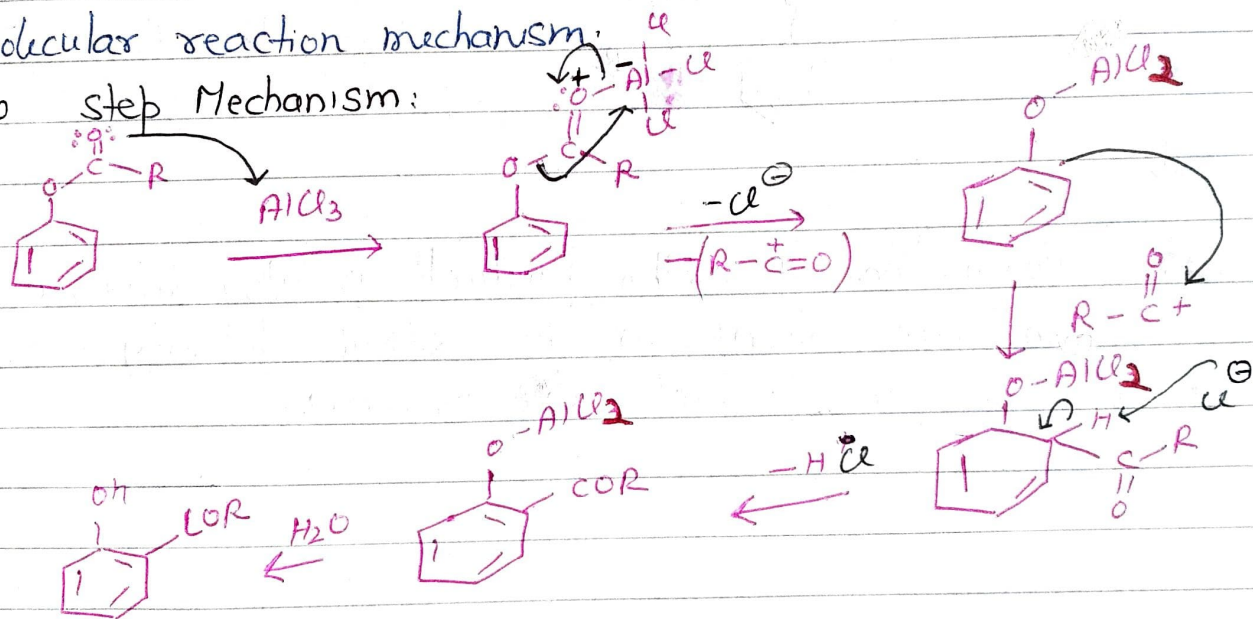


where
R = aliphatic
or aromatic

ortho product + para product

Mechanism: Exact mechanism is still not clearly understood. There is evidence for both intermolecular and intramolecular reaction mechanism.

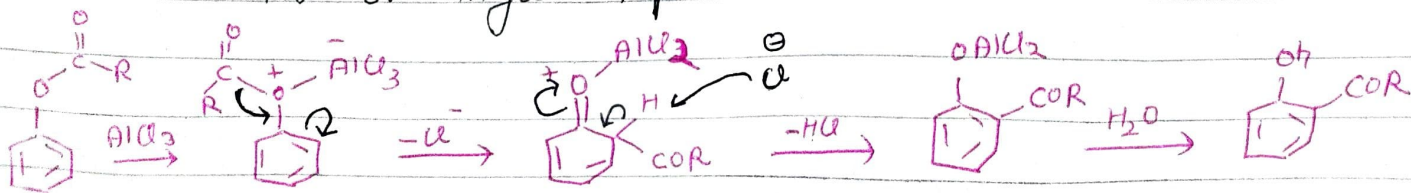
i) Two step Mechanism:



In first step, $AlCl_3$ forms complexes with the oxygen of acyl group phenoxy group from which the acylium ion is generated. The acylium ion then attacks the benzene ring as in the case of Friedel-Craft reaction.

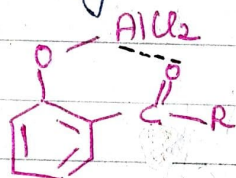
Similar attack at para-position gives the para-isomer.

ii) Concerted or Single step Mechanism:



Note 1: In practice both ortho and para products are formed. The amount of each isomer depends on temperature, solvent, amount of catalyst and on the structure of the substrate.

Note 2: At low temperature ($<100^{\circ}\text{C}$), para-isomer is the major product, while at high temperature ($>100^{\circ}\text{C}$), ortho isomer is the major product. This is because the intermediate of ortho-isomer is stabilized by chelation and is hence more thermodynamically stable.



Low temp is kinetically controlled
High temp is thermodynamically controlled

Note 3: Formation of ortho-product is also favoured in non-polar solvent, as the solvent polarity increases, the ratio of para-product also increases.