AROMATIC COMPOUNDS

30-04-2020 (Lecture-8) Deg-II (Hons.& sub.)

P-IV Ch- 4
Ch-6 G- 'C'

TOPIC - CLASSIFICATION OF SUBSTITUENTS And THEORY OF ACTIVATION & DEACTIVATION

Classification of substituents

Substituents either activate or deactivate a benzene ring towards electrophiles and direct selective substitution at specific sites on the ring.

All substituents can be divided into three general types :- - -

Type 1

Ortho , Para directors & activators

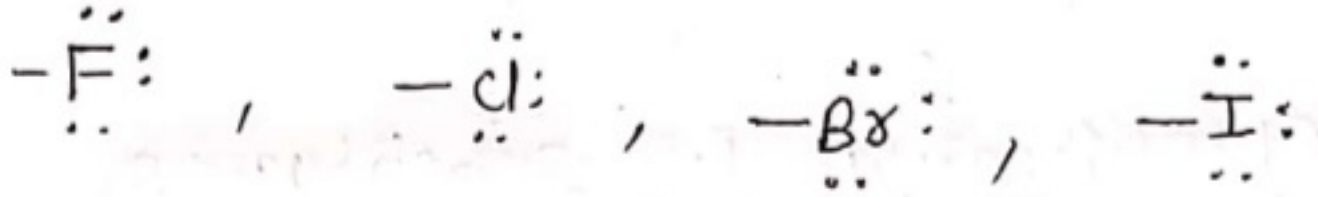
Substituents that activate a benzene ring and direct substitution at ortho and para positions.

$-R < -\ddot{N}HCOR < -\ddot{O}R < -\ddot{O}H < -\ddot{N}H_2 = -\ddot{N}HR = -\ddot{N}R_2$

INCREASING ACTIVATION

Ortho , Para deactivators

Substituents that deactivate a benzene ring and direct substitution at ortho and para position.

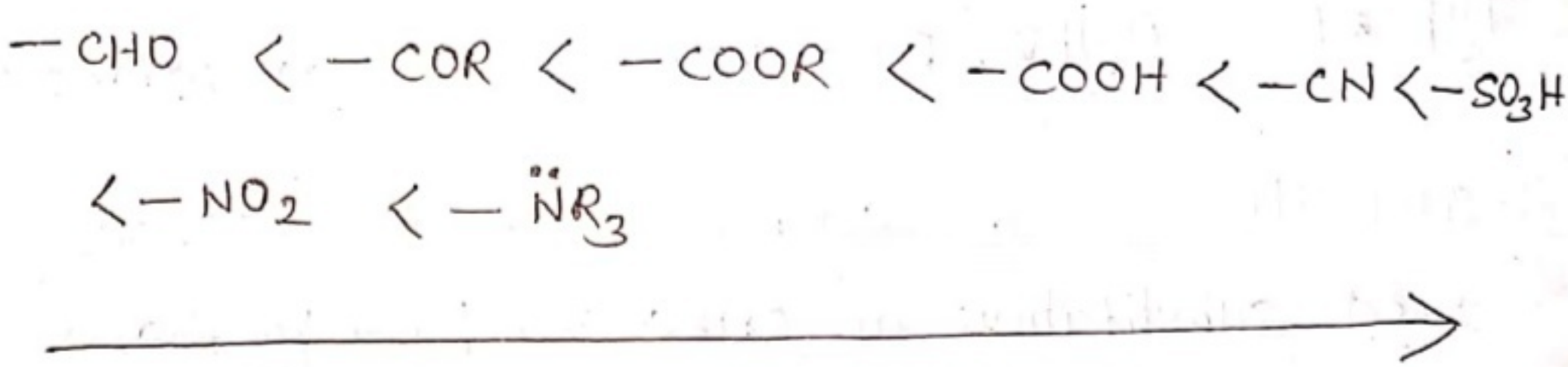


Type 3

Meta directors

Substituents that direct substitution at meta position.

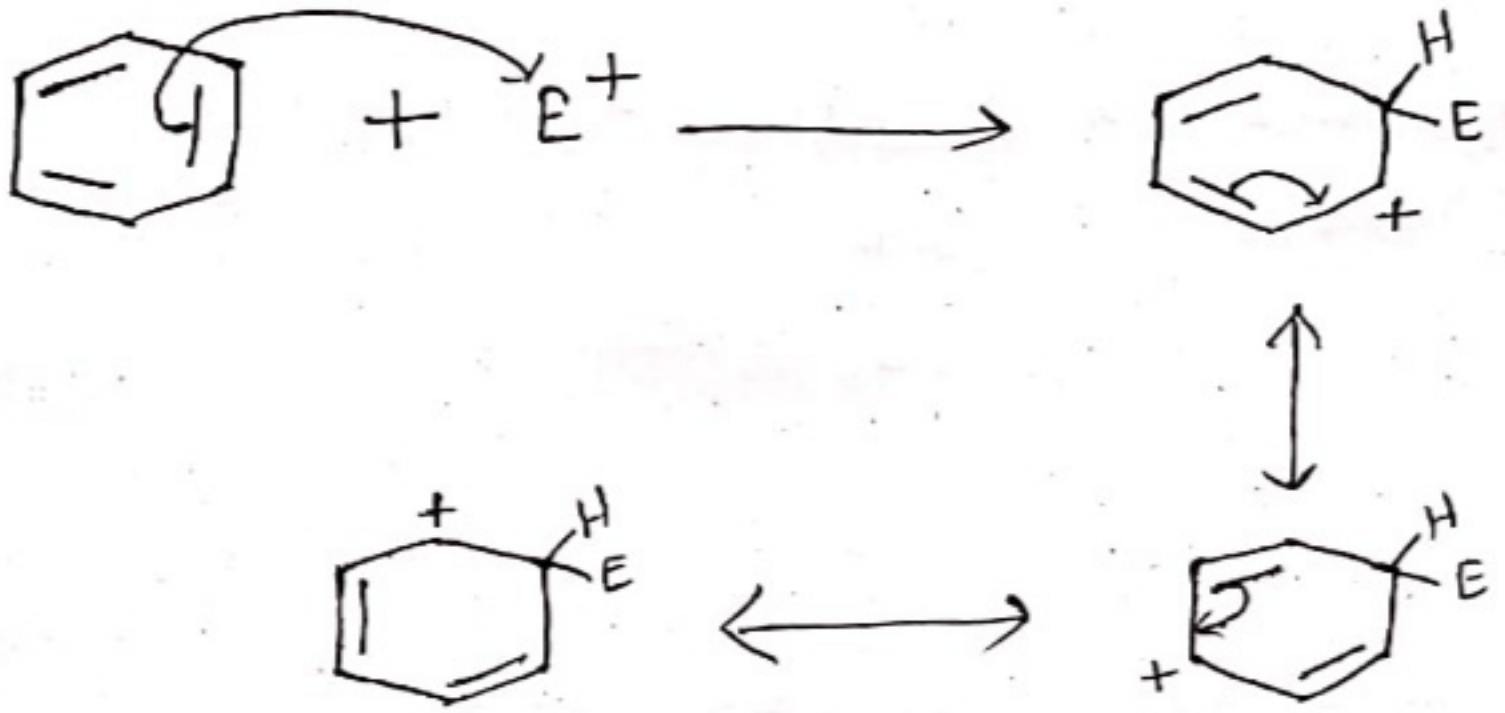
All meta directors deactivate the ring.



INCREASING DEACTIVATION

Classification of substituents
~ completed ~

THEORY OF ACTIVATION & DEACTIVATION



* Stabilizing the carbocation makes the reaction faster.

1. The most stable the carbocation the lower in energy the transition state that forms it, and the faster the reaction.

2. Electron - donating groups stabilize the carbocation making the reaction faster.

3. Electron - withdrawing groups destabilize the carbocation, making the reaction slower.

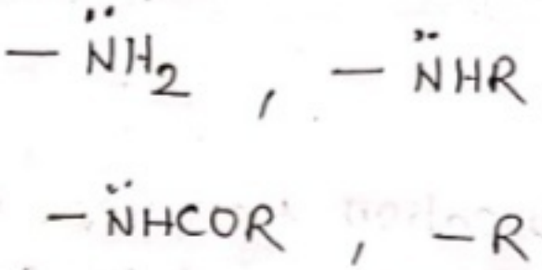
4. In other words, electron donating groups activate benzene - ring and electron - withdrawing groups deactivate a benzene ring towards electrophilic attack.

Note 1.

All activating groups are either 'R' groups or they have a N or O atom with a lone pair directly bonded to the benzene ring.

These are electron donor group.

example ;

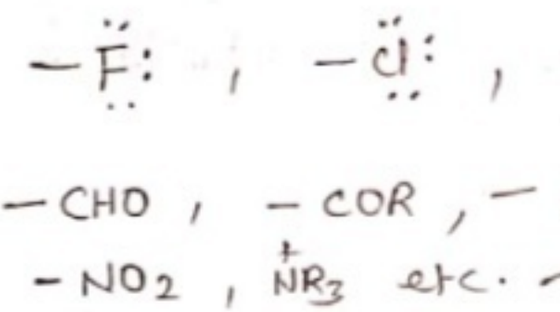


Note 2.

All deactivating group are either halogens or they have an atom with a partial or full positive charge bonded directly to the benzene ring.

These are the electron withdrawing groups.

example ;



Theory of Activation & Deactivation

~completed~

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