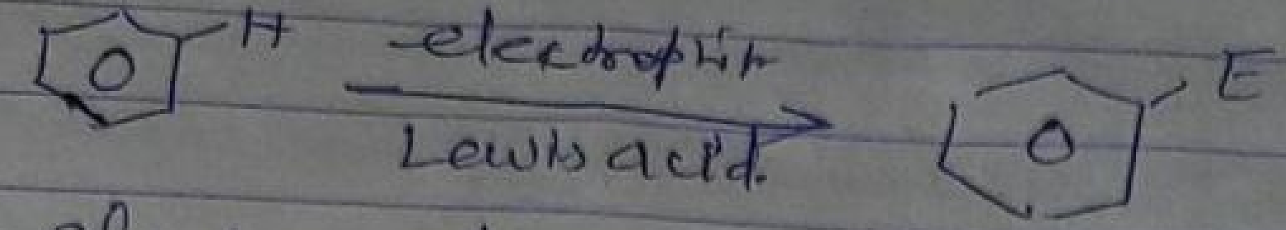
A[illegible]tic electrophillic substitution :
(SE2)

①

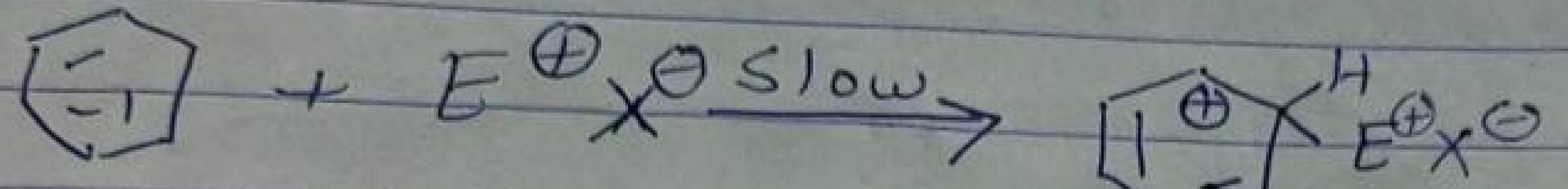
* Bimolecular, formation of intermediate]
* electron cloud of Benzene ring. arenium ion

[Common Mechanism]



* electron donating substituents increase the rate.
* electron withdrawing " decrease " "
* Proceeds through carbocation
* Breakage of C–H is not the slow step. The first step is the rate determining step.

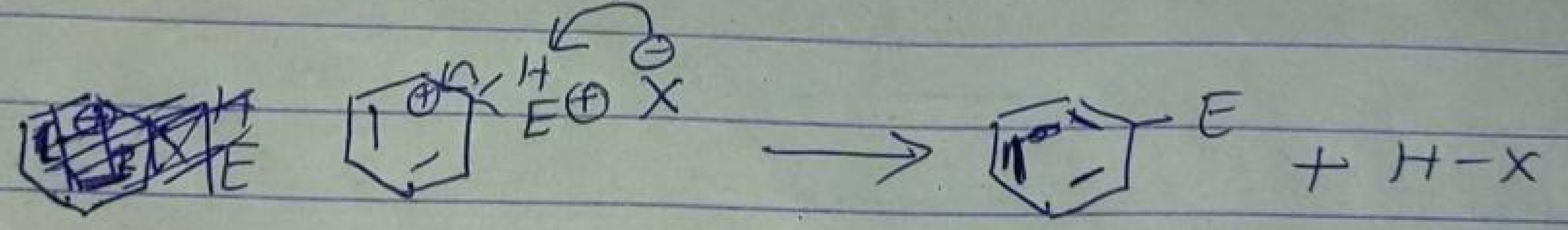
Step 1 → Attack of electrophile – pi bond of the aromatic ring.



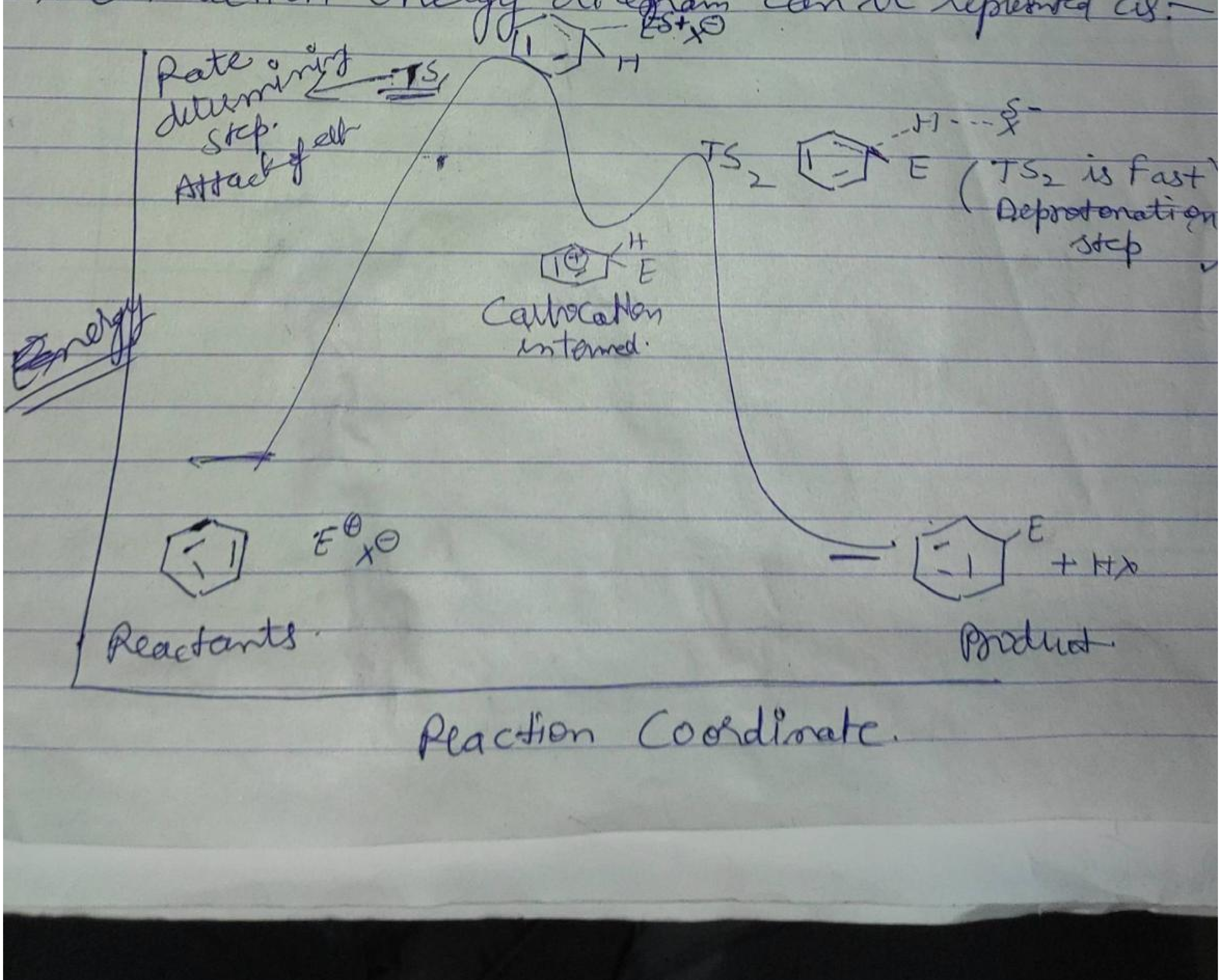
Formation of Carbocation intermediate.

It is known as → arenium ion, Benzenonium ion, Wheland intermediate

Step 2 → Breakage of C–H bond to restore aromaticity.



The Reaction energy diagram can be represented as:–

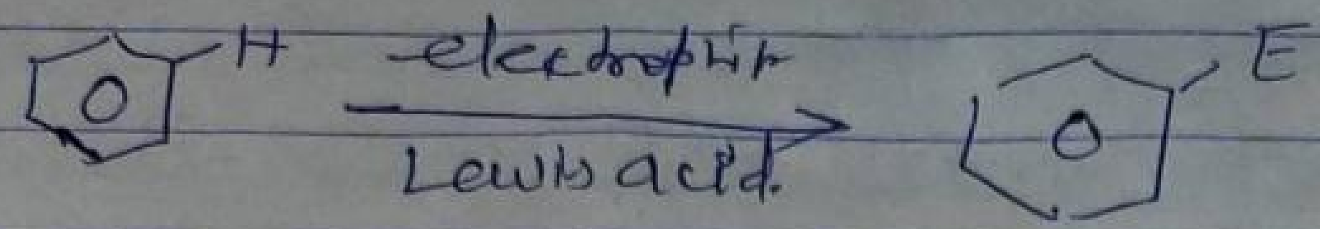


Reaction Coordinate.

Aromatic electrophillic substitution : (SE2) ①

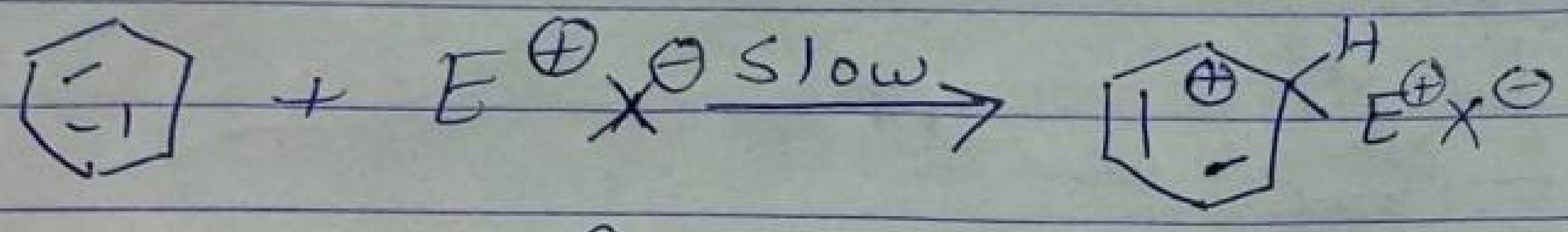
* Bimolecular, formation of intermediate]
* electron cloud of Benzene ring. arenium ion

[Common Mechanism]



* electron donating substituents increase the rate
* electron withdrawing. " decrease " "
* Proceeds through carbocation
* Breakage of C-H is not the slow step. The first step is the rate determining step.

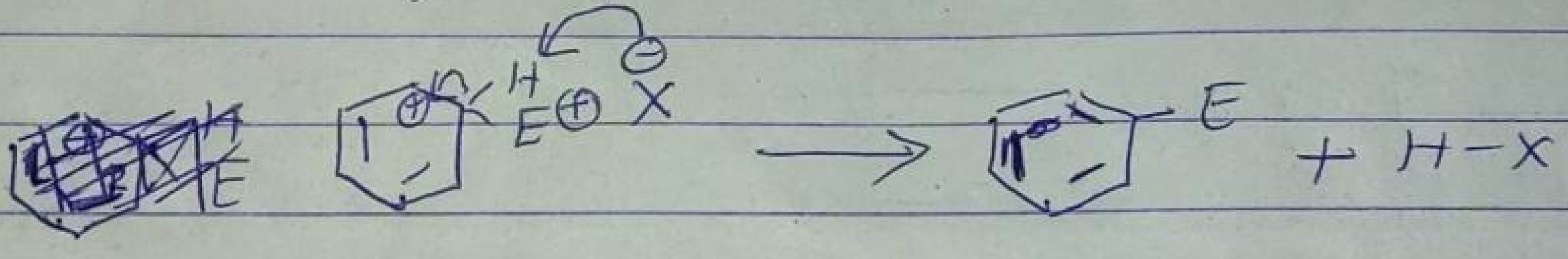
Step 1 → Attack of electrophile - pi bond of the aromatic ring.



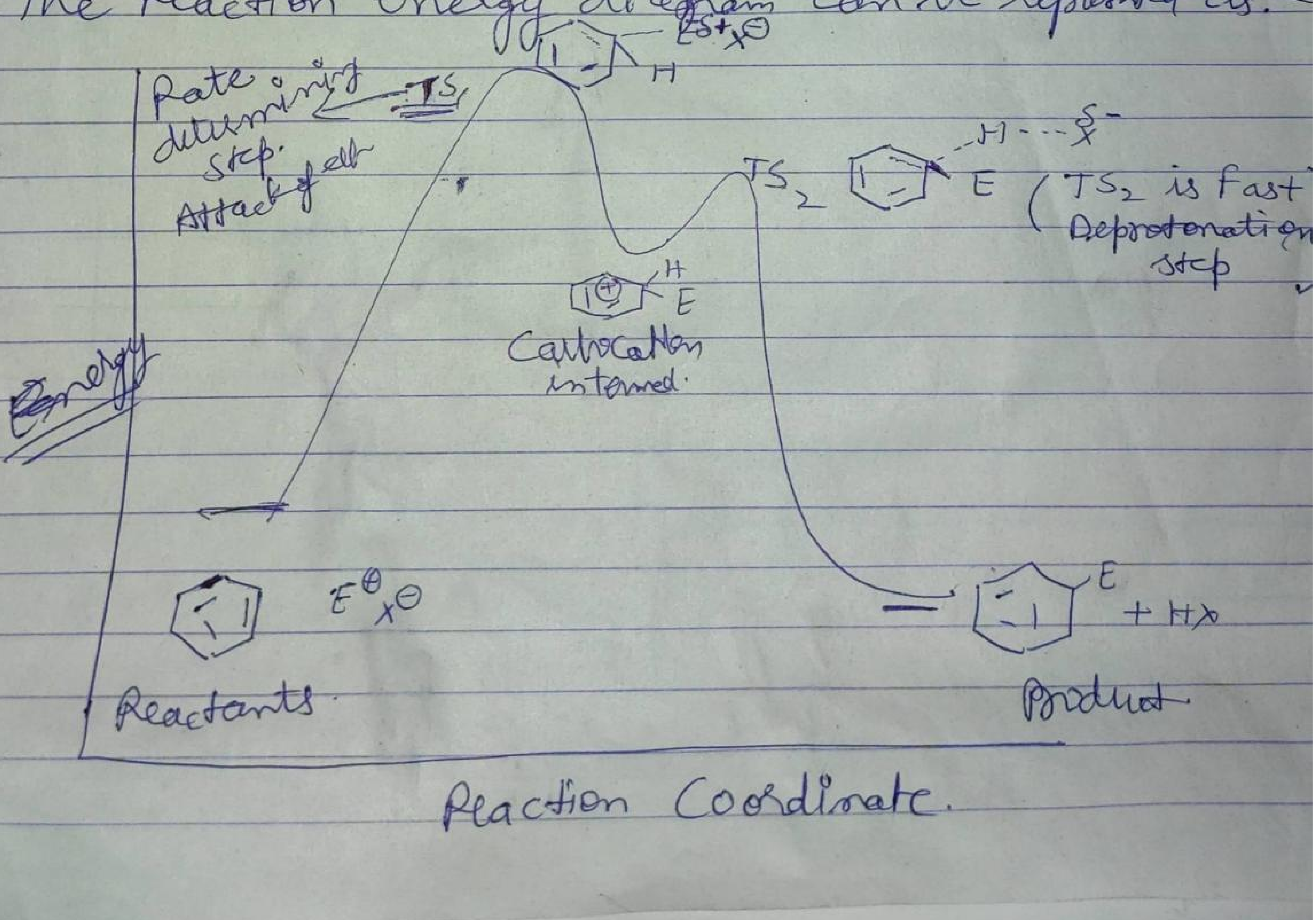
formation of Carbocation intermediate.

It is Known as → arenium Ion, Benzenonium ion, Wheland intermediate

Step 2 → Breakage of C-H bond to restore aromaticity.



The Reaction energy diagram Can be represented as:-



Aromatic Electrophilic Substitution:

Orientation and Reactivity in Monosubstituted Benzenes:

(1) o, p directing and activating gp. (+I effect and +R effect)

(2) m - directing and deactivating gp. (−R effect)

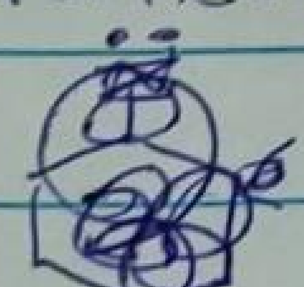
(3) o, p directing but deactivating gp. ⇒ halogens

↳ Here two opposite effect +R effect.
−I effect.

(1) Explanation based on Charge distribution → +R, −R, +I, −I effect.

(2) Explanation based on Carbocation stability →

(1) o, p directing and activat



↳ Resonating str.

Aromatic electrophilic Substitution →

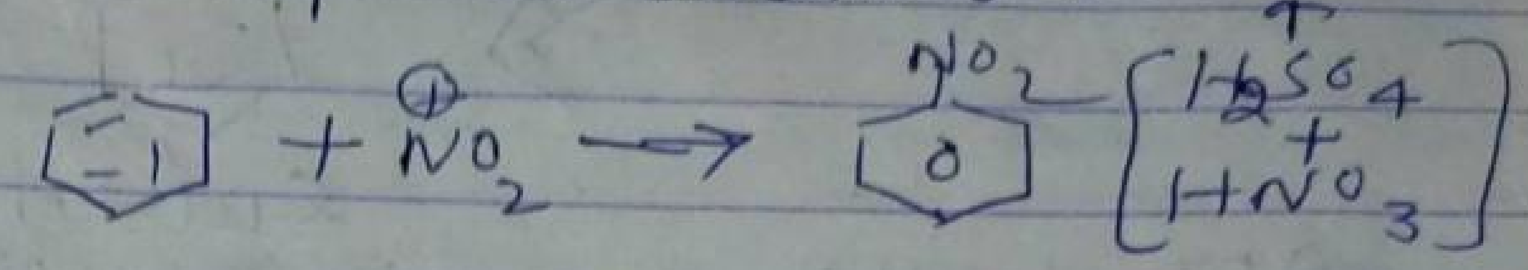
① Substitution Reaction (SE_2) — Bimolecular

~~R-X~~ →

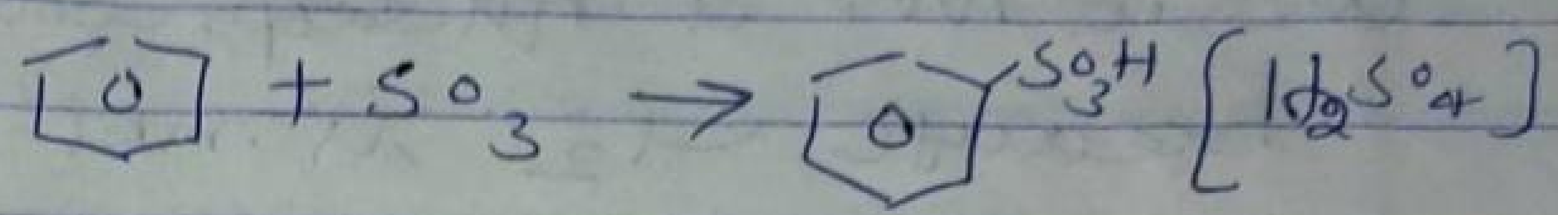
Reaction: Atom attached to an aromatic system (usually Hydrogen) is replaced by an electrophile.

Some important Aromatic electrophilic substitution – Catalyst

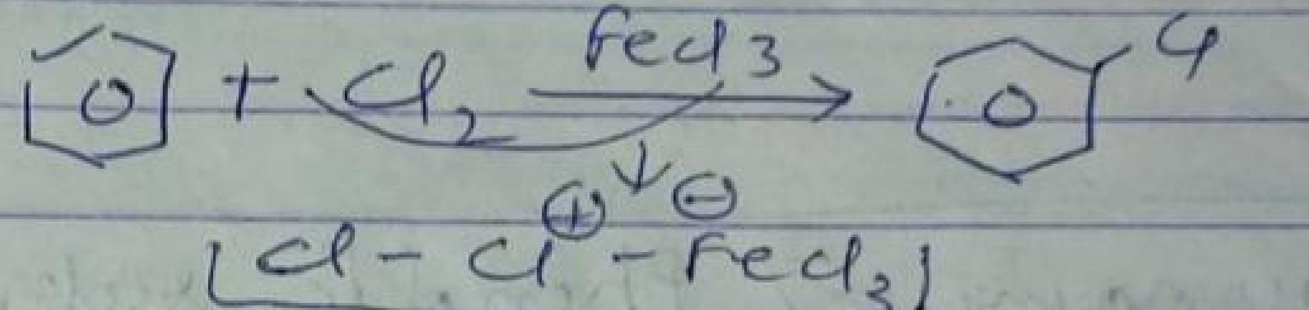
1. Aromatic Nitration reaction



② Aromatic Sulphonation reaction



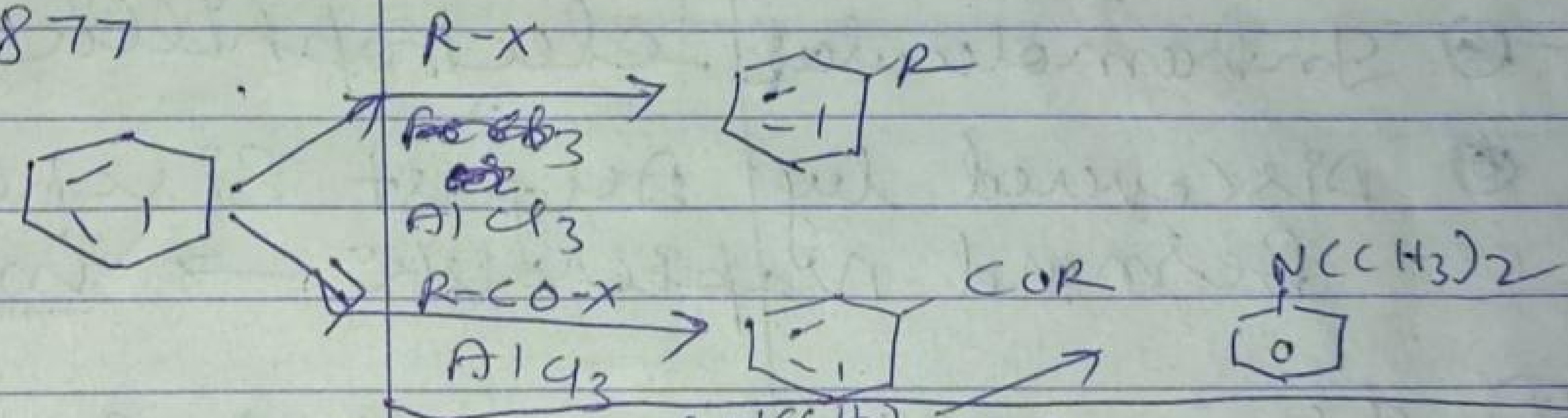
③ Halogenation.



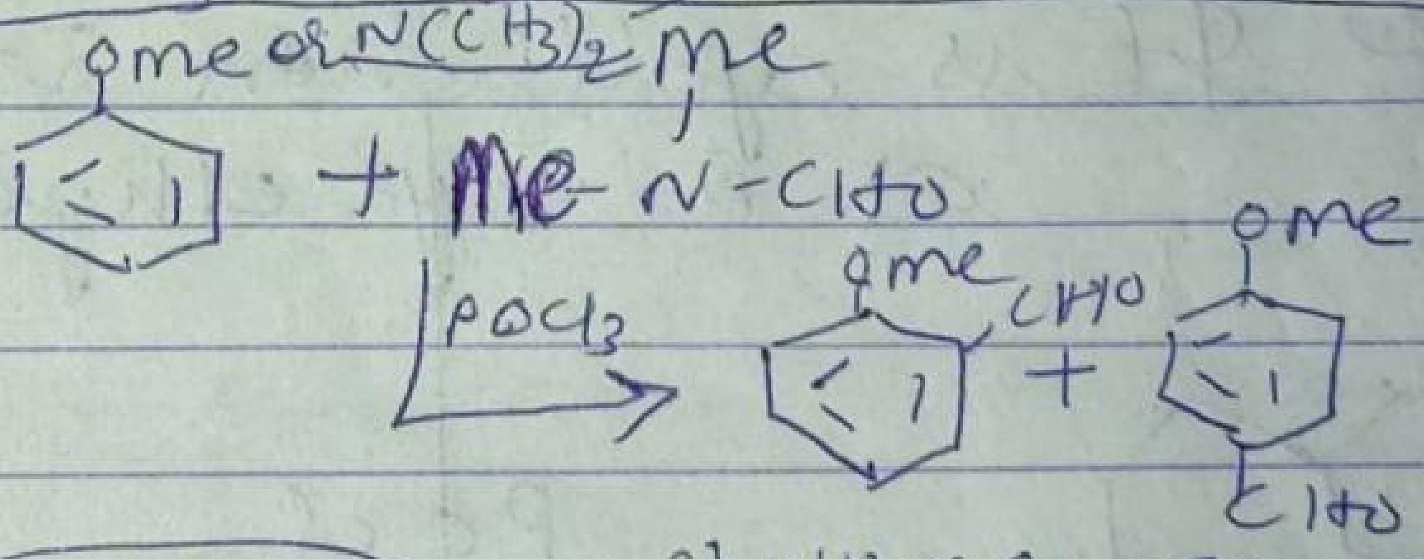
halogen lewis acid complex.

④ Fridel-Crafts Reaction
- → Friedel-Crafts Alkylation
- → Friedel-crafts Acylation

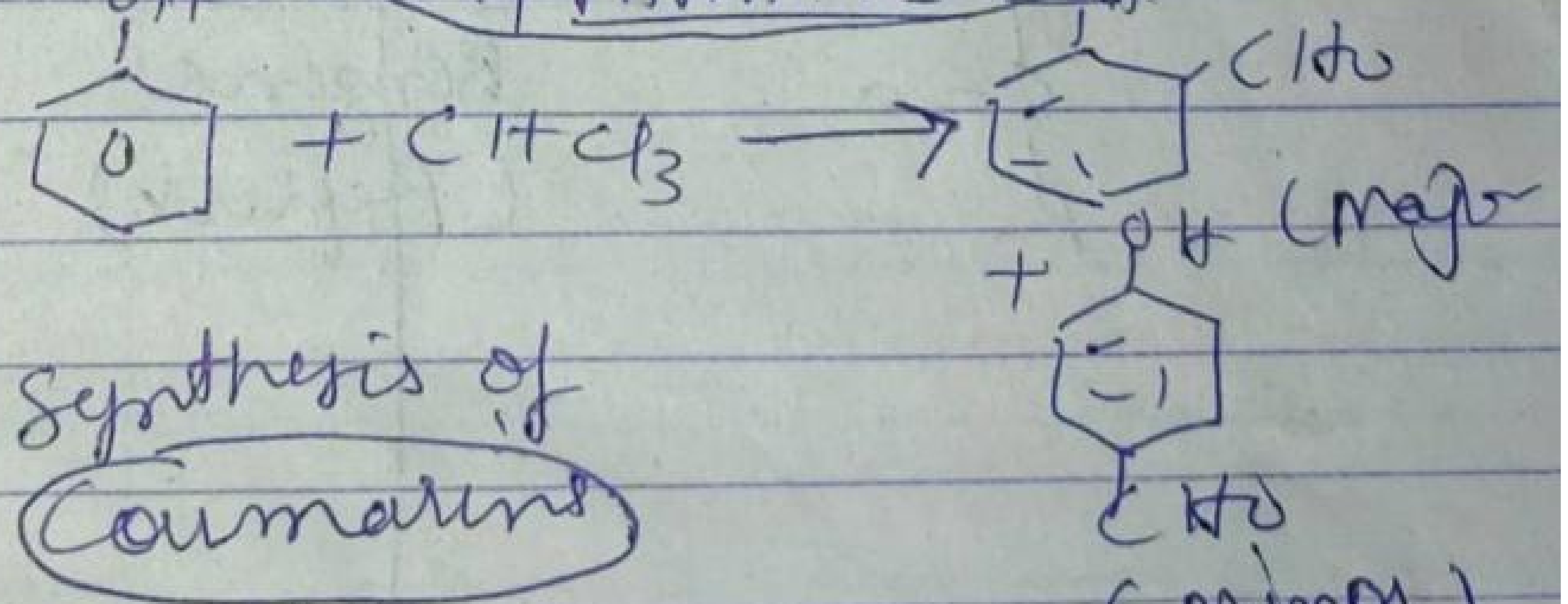
Charles Friedel, James crafts in 1877



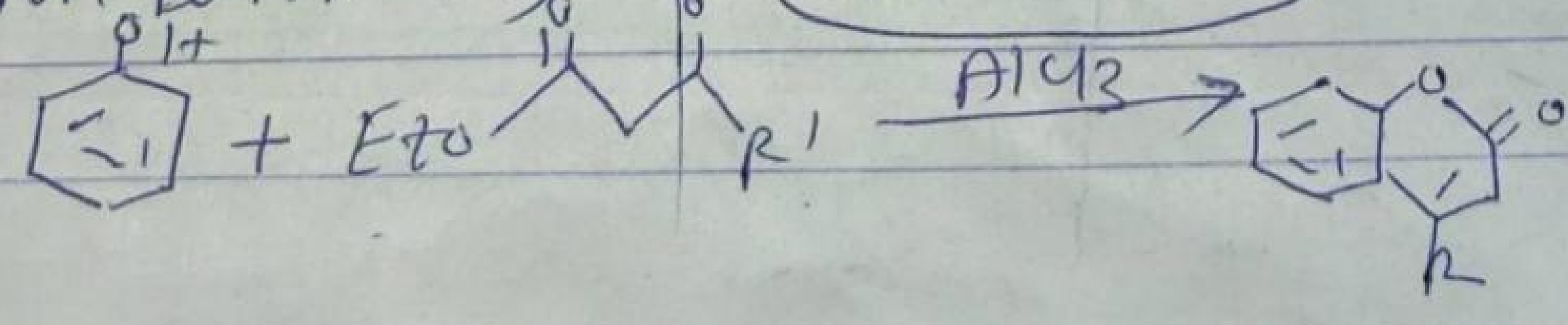
⑤ Vilsmeier-Haack Reaction [formylation of active Aromatic Compound] in Pr. of Phosphorous oxychloride.



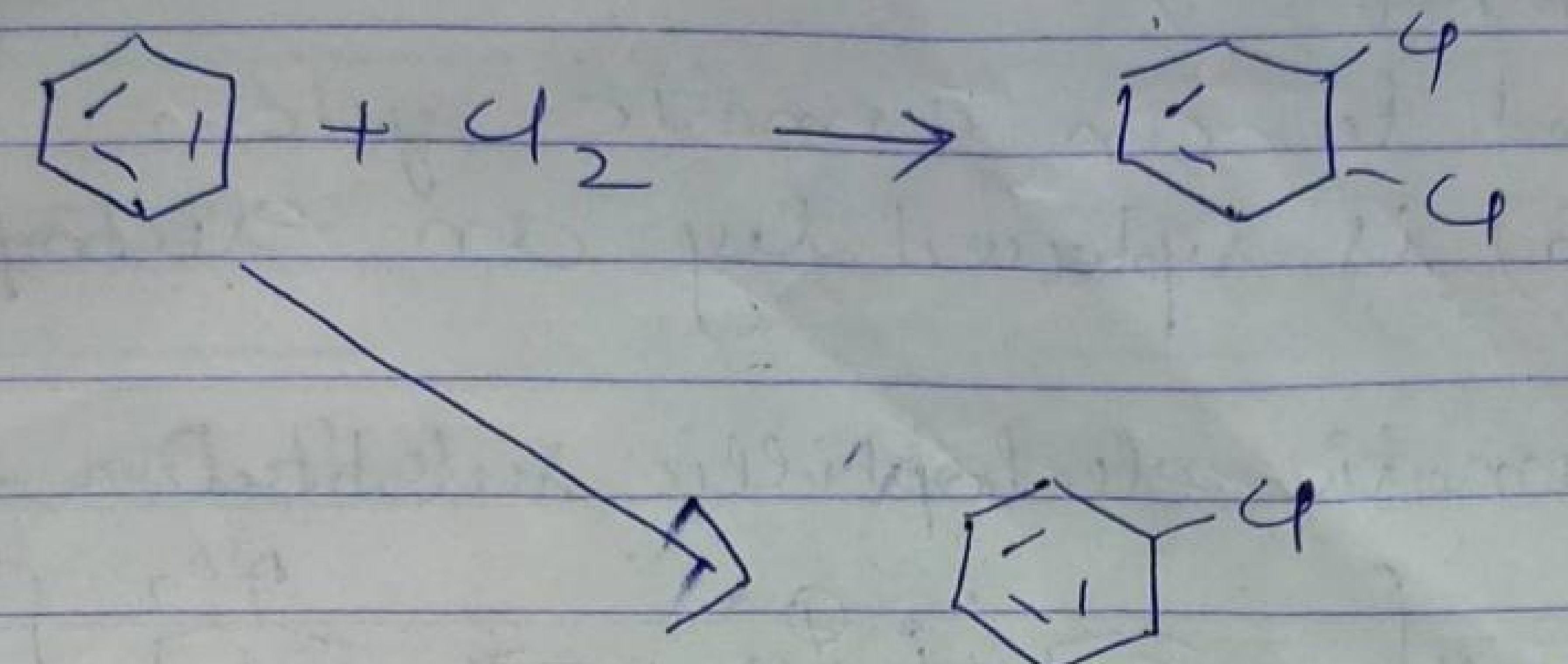
⑥ Reimer-Tiemann Reaction



⑦ Pechmaann reaction (Hans von Pechmann) ⇒ Synthesis of Coumarins



* Like Alkenes → Benzene not give addition Product



(Not observed)

Substitution Product.

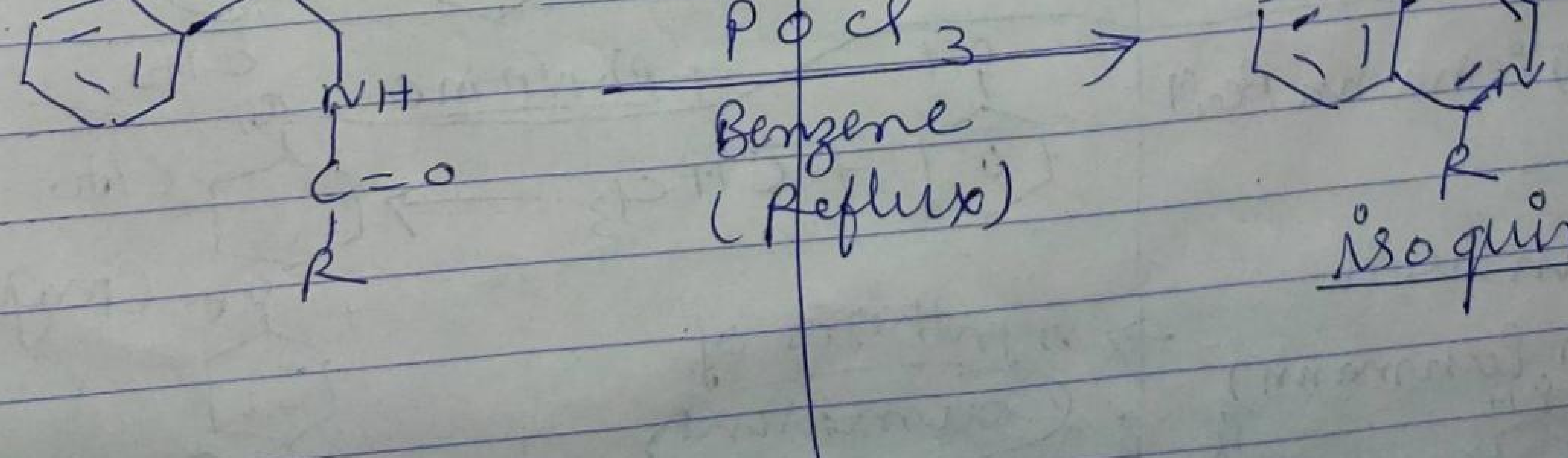
* But Not a ~~nucleophillic substitution~~ reaⁿ.
because Cl_2 is not a nucleophile and $H^{\ominus}$ is not a leaving gp.

*

Coumarin → Phenolic substances Composed of fused benzene and α-Pyrone ring.

(8) Bischler-Napieralski Reaction

* Intramolecular electrophillic reaction
* Discovered by August Bischler and Bernard Napieralski → in 1893
* It is cyclization reaⁿ of β-arylethylamide or β-arylethyl carbamates.



isoquinolines.