

Furan (C_4H_4O) (Oxole)

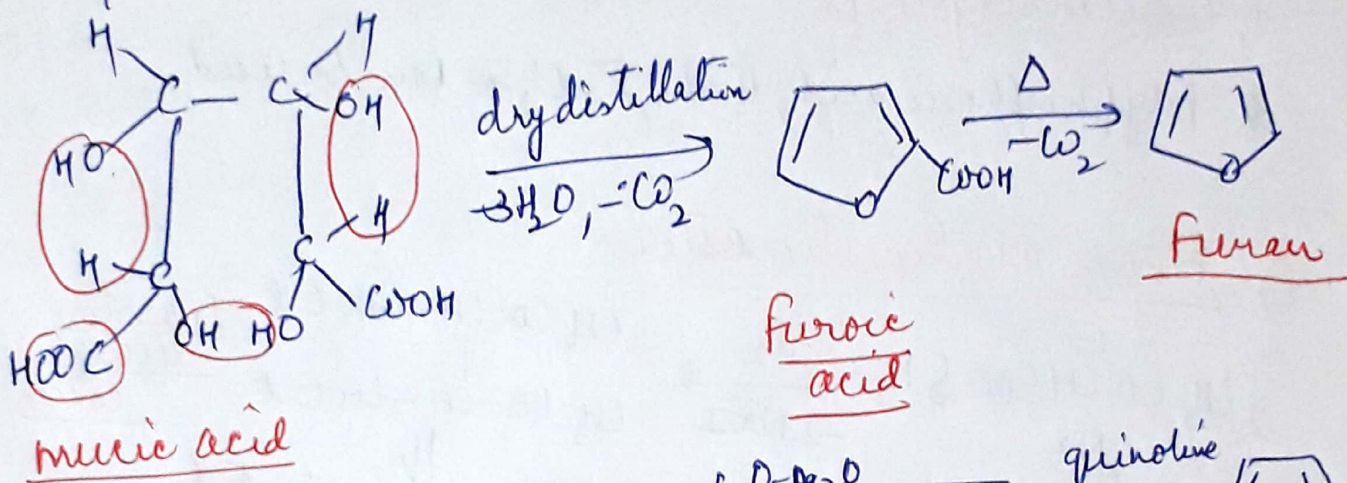


Preparation :

→ present in pine wood tar and isolated when saw dust of pinewood is distilled.

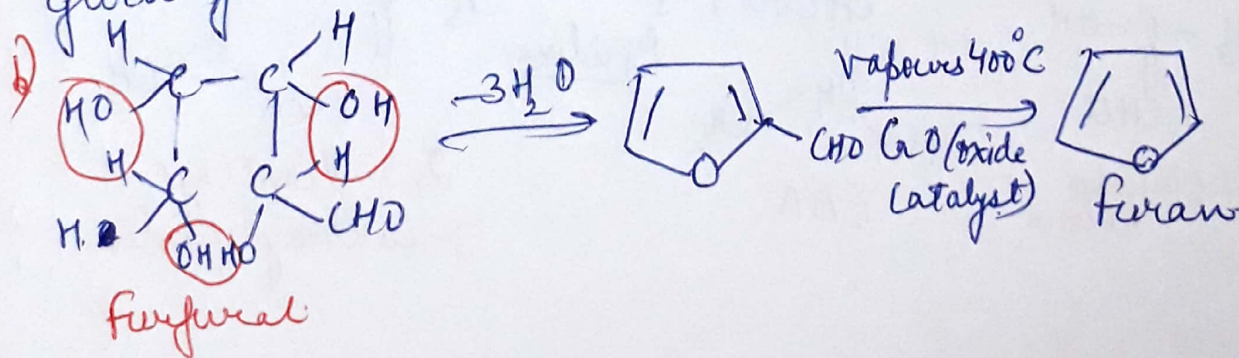
① From Mucic acid : (Scheele Method) :

On dry distillation, mucic acid converts to furic acid which gives furan on heating it to its boiling point.

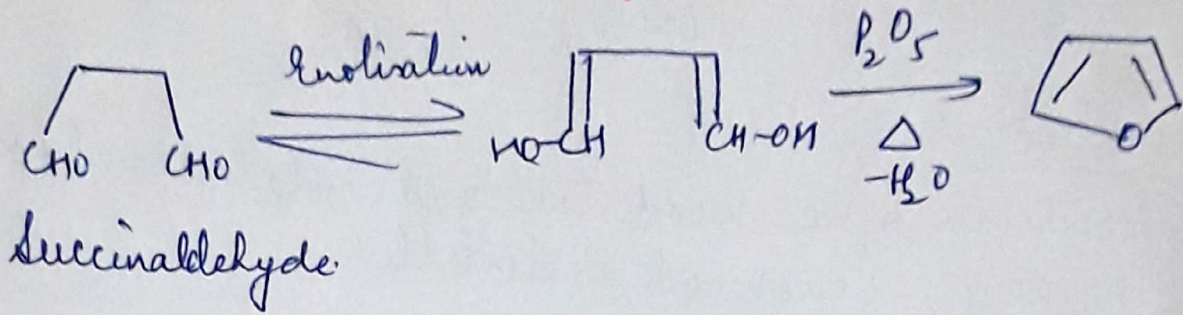


② From furfural :

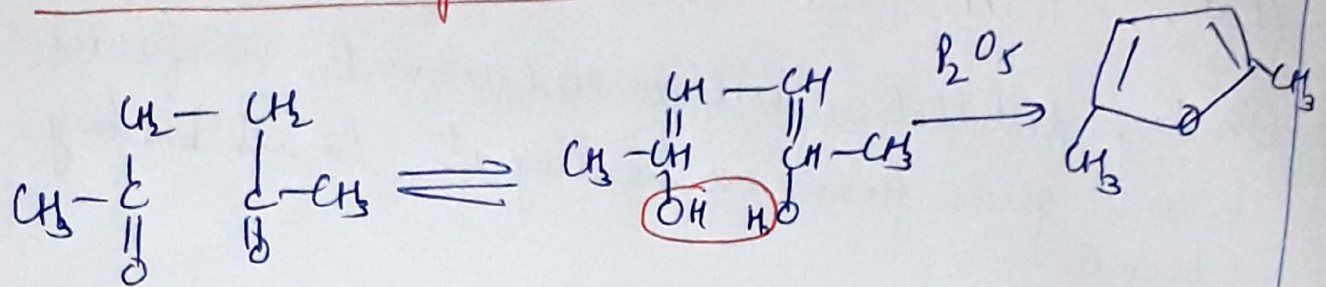
Furfural on oxidation with $CuO-Ag_2O$ in $NaOH$ gives furic acid which on decarboxylation with quinoline in the presence of Cu powder gives furan.



3) From succinic aldehyde :-



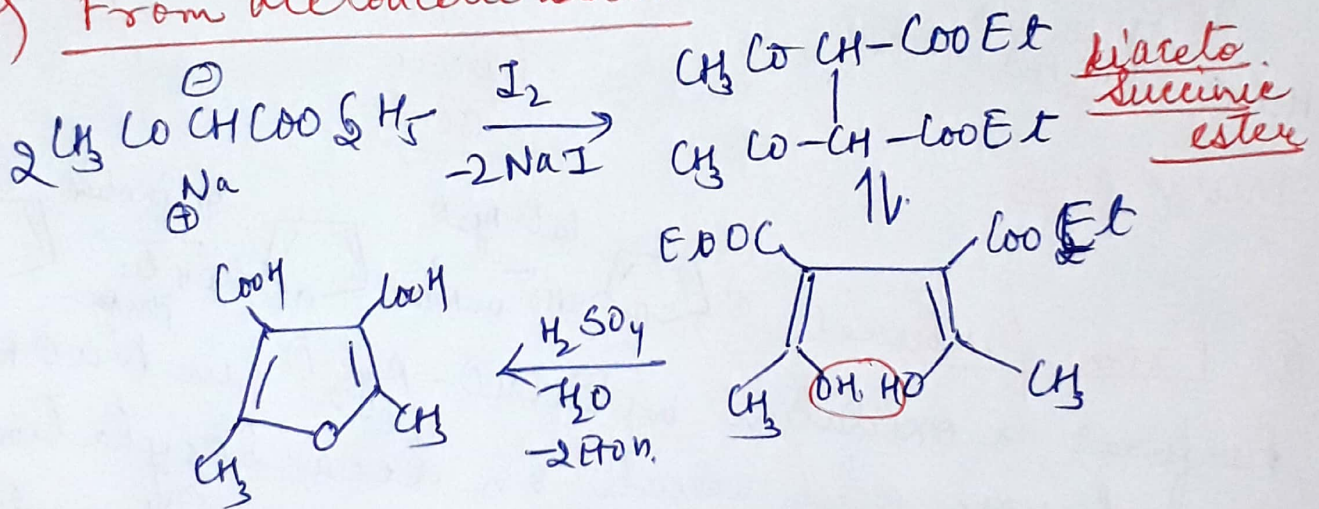
4) Pall-Knorr Synthesis :-



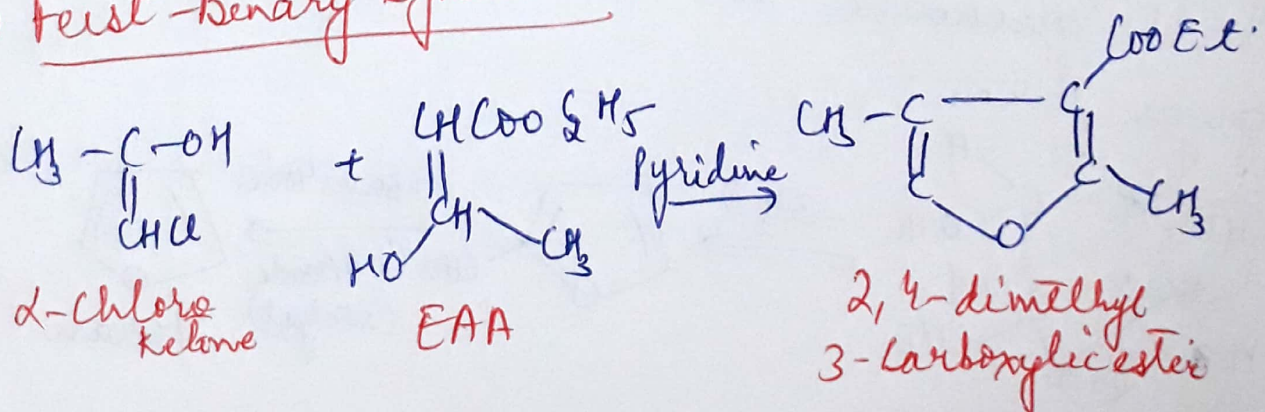
1,4-dicarbonyl compd.

* Polyphosphoric acid, H_2SO_4 , $ZnCl_2$ can be used.

5) From acetoacetic ester :-



6) Feist-Benary Synthesis :-

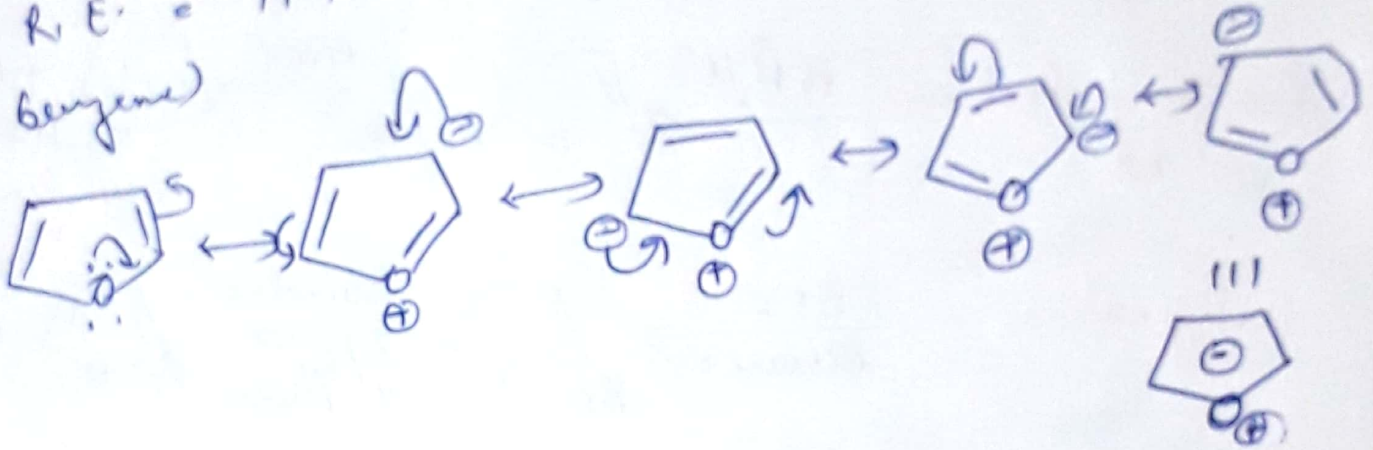


Properties:

- Colourless liquid, smell like Chloroform.
- B.P. 132°C
- insoluble in water, soluble in alcohol and ether.
- Dipole moment $\rightarrow 0.7\text{ D}$.
- Mild basic character & inactive towards base.
- * Pine splint dipped in conc. HCl gives green colour with its fumes (diff. from pyrrole).

Structure:

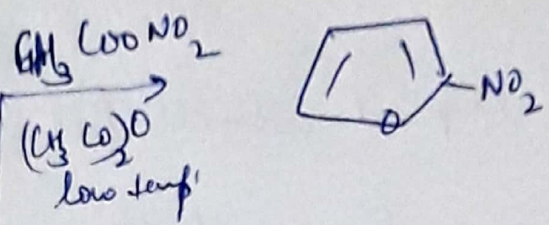
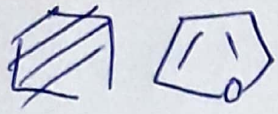
- has a aromatic sextet.
- R.E. = $71.1 - 96.2\text{ KJ/mol}$ (16 Kcal/mol), (less than benzene)



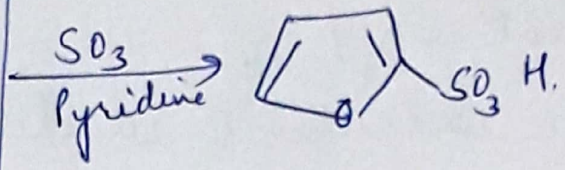
Electrophilic Substitution Rxns:

Similar to pyrrole. 2nd & 5th position.

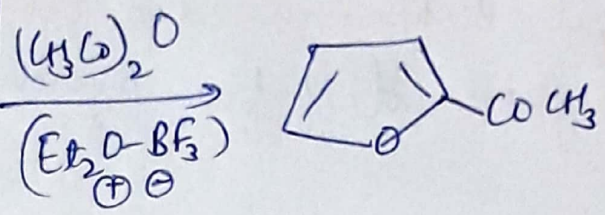
* In case of alkylation, polymerization of furan takes place.



Nitration

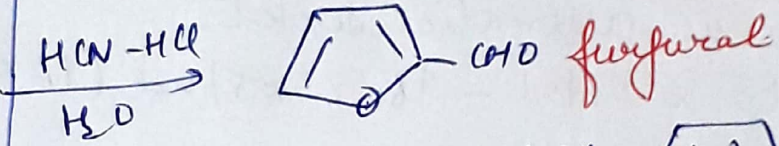


Sulfonation



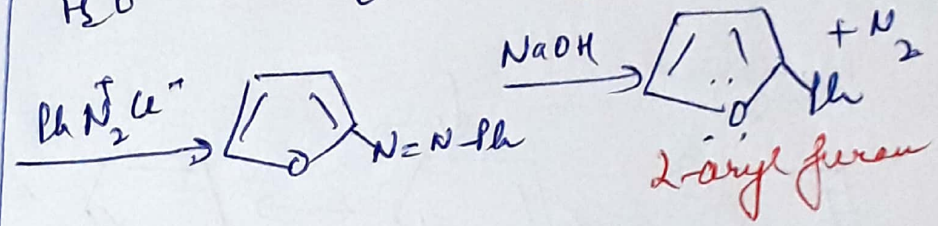
F Craft acylation

Gratlerman Koch Rx



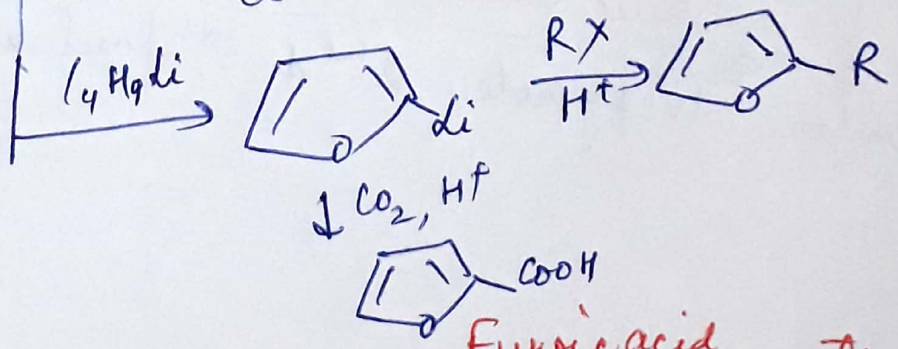
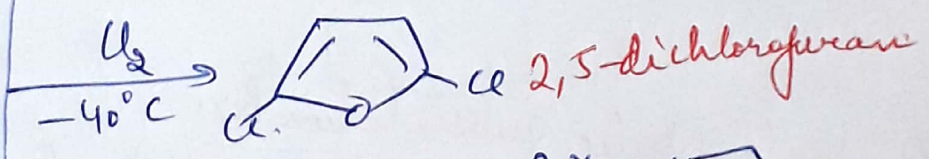
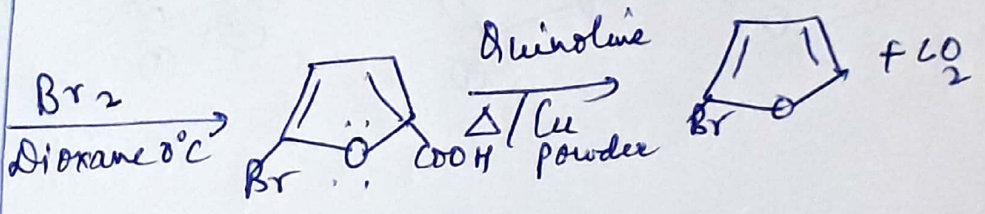
furfural

Gronberg Bachmann Rx



2-aryl furan

Halogenation

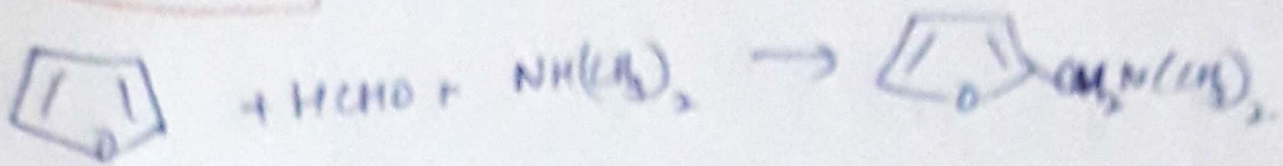


Furvic acid

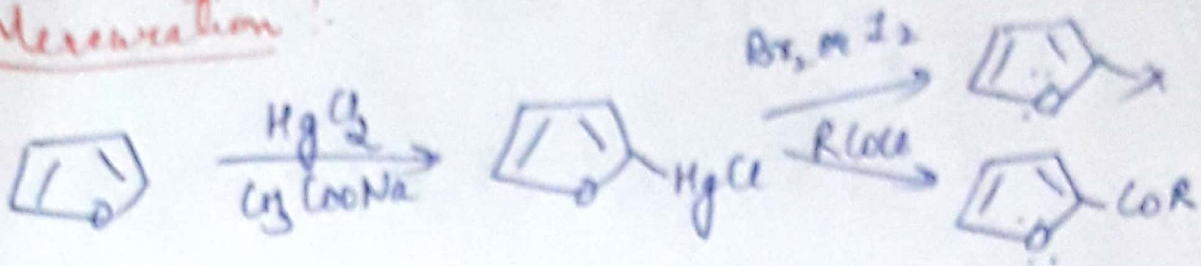
* Strong acid used for nitration and sulfonation cause polymerization. At room temp, Halogenation is extremely vigorous & halogen acids formed cause

Polymerization:
→ In 4

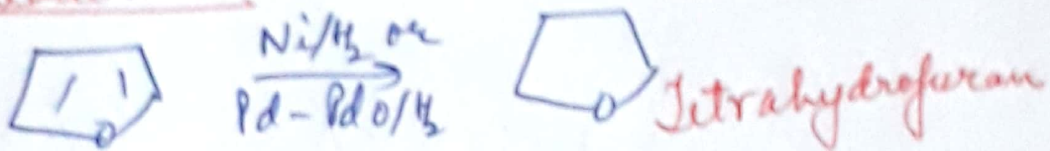
Mannich Rx:



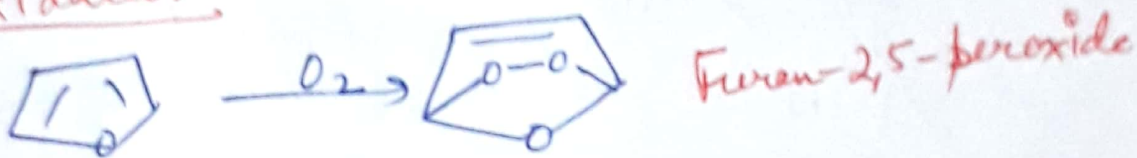
Mercuriation:



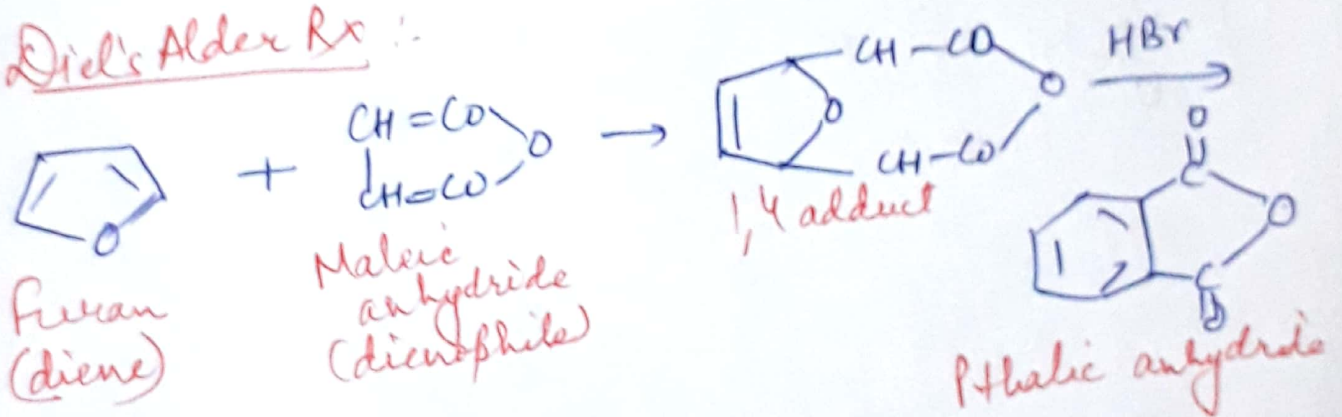
Reduction:-



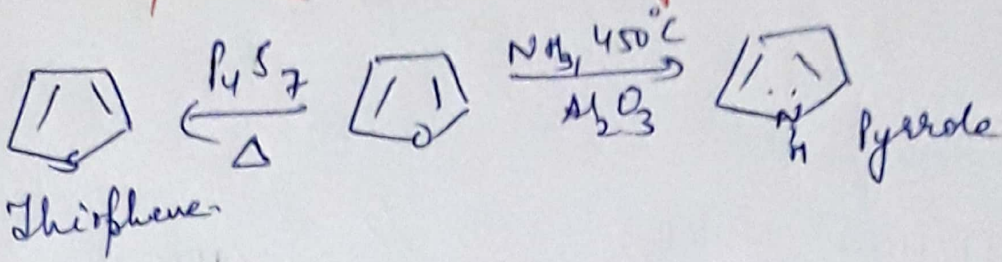
Oxidation:-



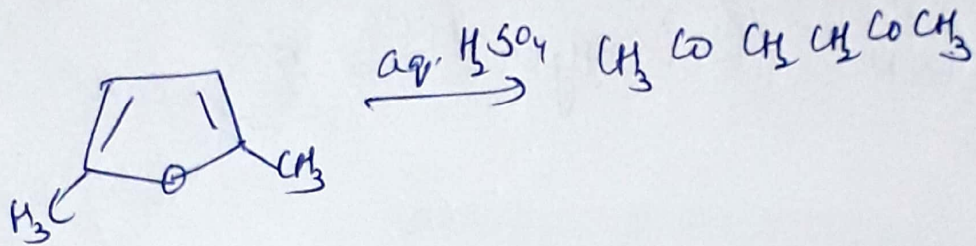
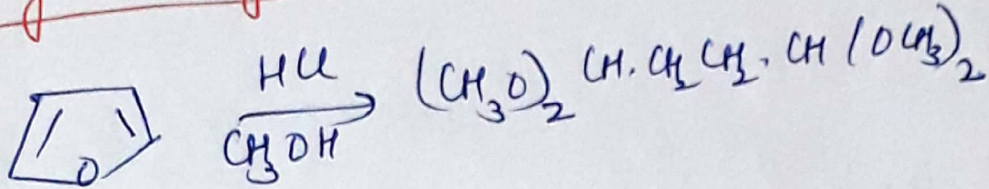
Diels Alder Rx :-



Thiophene \leftarrow Furan \rightarrow Pyrrole



Ring Opening Rx:-



Other Rxs:-

