Important Questions

(From Previous Year)

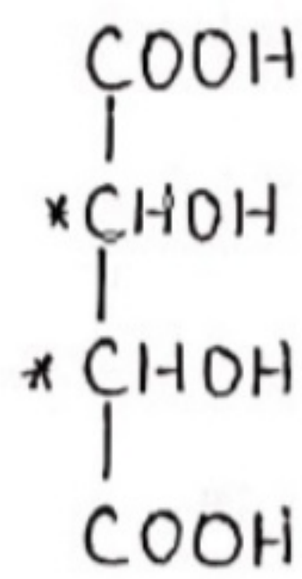
For Degree-I (Hons.)

By-Dr.Rinky ,Dept.of Chemistry, 14/10/2020

Explain the following :–

a. Tartaric acid exhibits optical isomerism.

Ans. Tartaric acid exhibits optical isomerism due to presence of two chiral carbon.



Star marked carbon is Chiral carbon.

Tartaric acid

* Due to presence of chiral carbon Tartaric acid molecule is asymmetric as show optical isomerism.

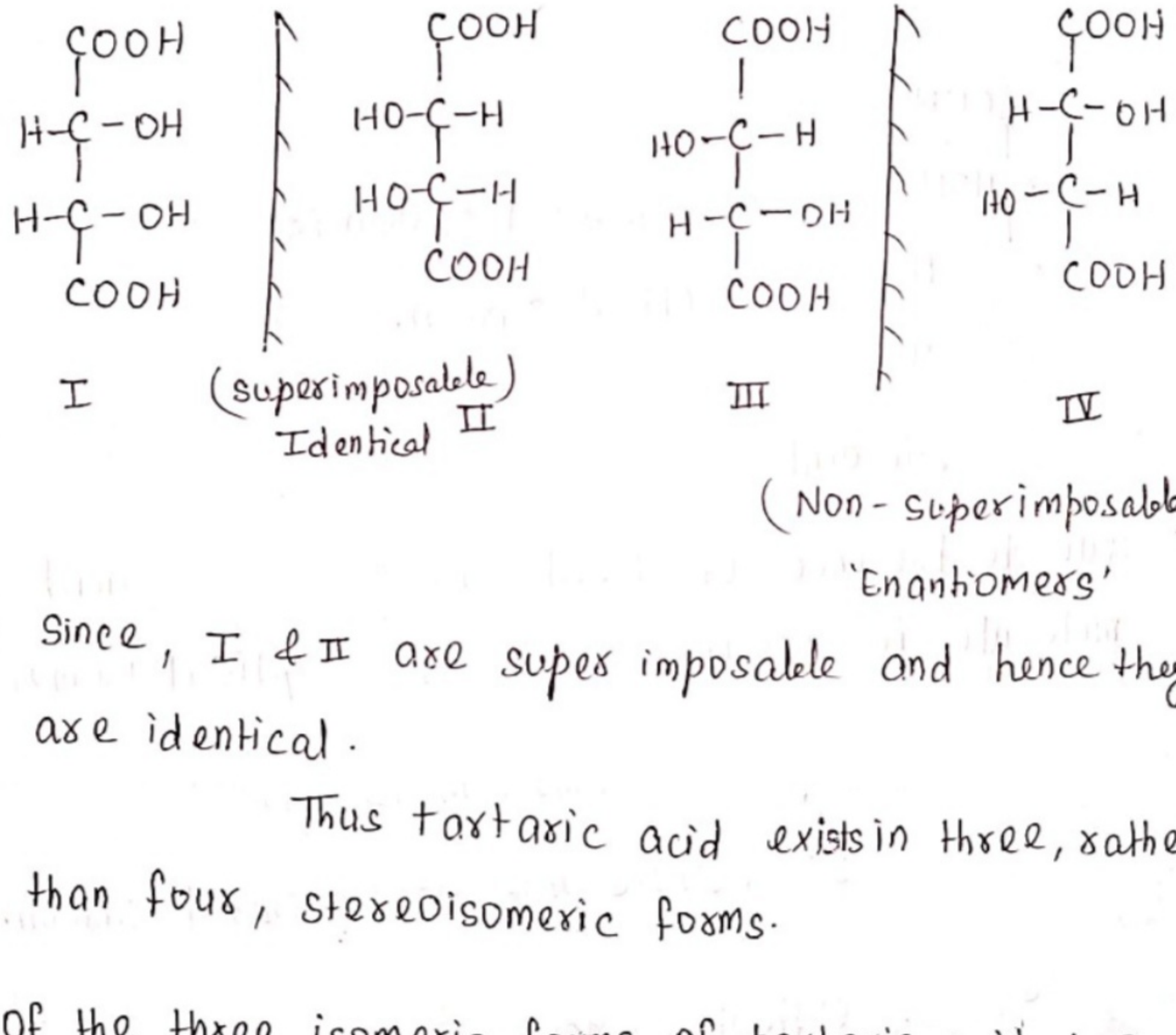
∵ No. of optical isomerism is given by formula 2^n, where n = No. Of chiral carbon.

∴ No. of optical isomerism shown by tartaric acid should be $2^2 = 4$, But actual no. of optical

isomer in this case is 3.

* One is dextro, other is laevo and another is meso.
* Out of these three dextro and laevo form are optically active while meso form is optically inactive due to internal compensation.

* Tartaric acid may be represented in the following four forms.

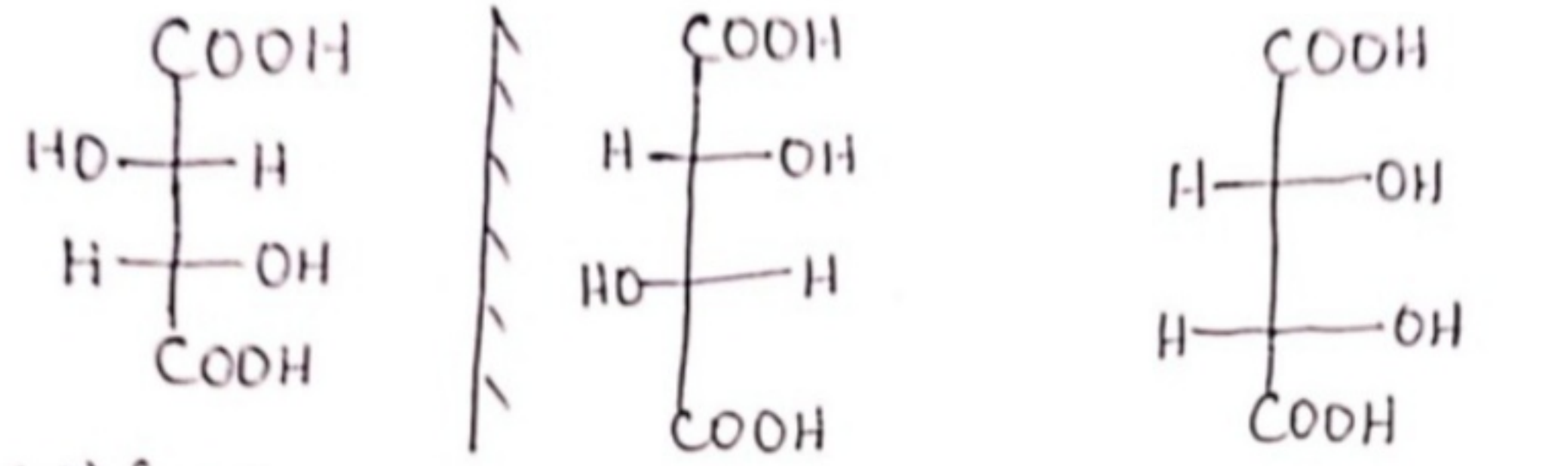


* Since, I & II are superimposable and hence they are identical.

Thus tartaric acid exists in three, rather than four, stereoisomeric forms.

Of the three isomeric forms of tartaric acid, two III & IV are non-superimposable mirror image (enantiom

Of each other, hence optically active, but as the third possesses a plane of symmetry, and hence it is optically inactive.



b. Acetaldehyde undergoes aldol condensation.

Ans. Aldol condensation reaction is given by aldehyde or ketone having α-hydrogen.

Aldehyde or ketones having α-hydrogen when treated with dil. alkali it produces β-hydroxy aldehyde, or β-hydroxy ketone. On Heating it produce α, β-unsaturated aldehyde or ketone.

This reaction is called aldol condensation reaction.

* Acetaldehyde ($H_3\overset{\alpha}{C}-CHO$) having $3\ \alpha$-H, hence they easily show aldol condensation.

4.

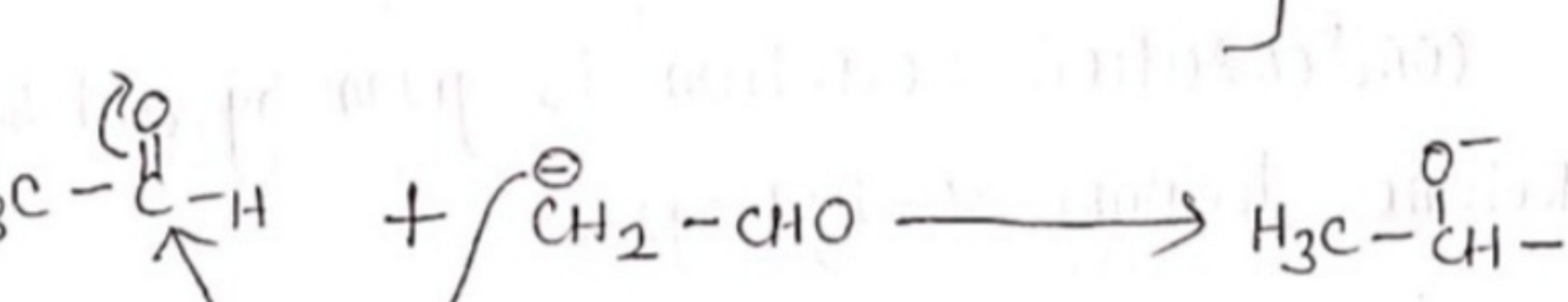
$$2\,H_3C-CHO \xrightarrow{dil.\ NaOH} H_3C-\underset{\underset{OH}{|}}{CH}-CH_2-CHO$$

(Aldol)

$$H_3C-\overset{\overset{H}{|}}{\underset{\underset{OH}{|}}{CH}}-\overset{\curvearrowleft}{CH}-CHO \xrightarrow{Heat} H_3C-CH=CH-CHO$$

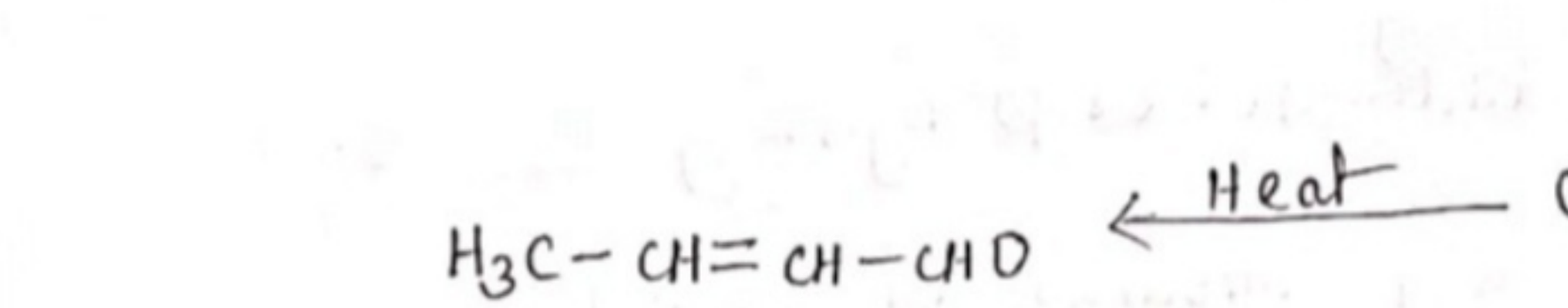
crotonaldehyde

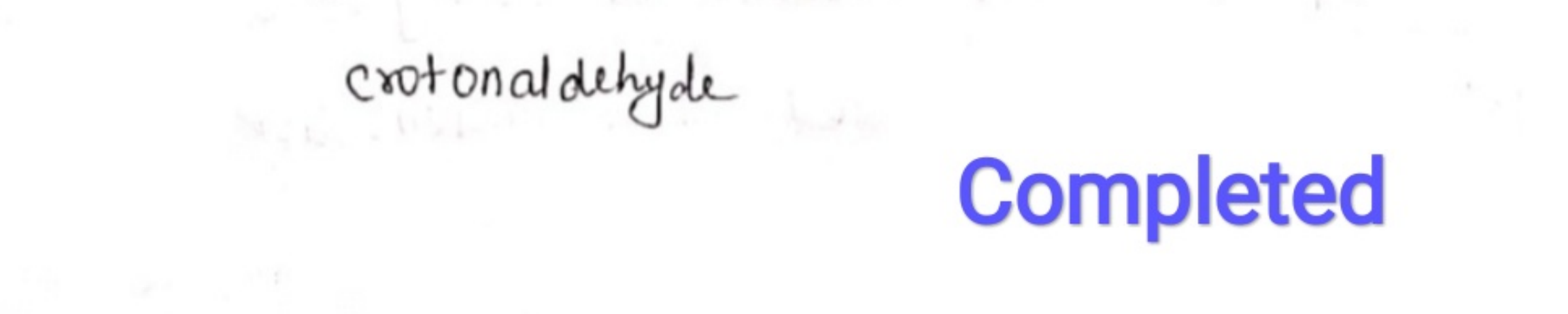
Mechanism



(Carbanion)

* Carbanion is resonance stabilised.





crotonaldehyde

Completed