Important Questions

1.

(From Previous Year)

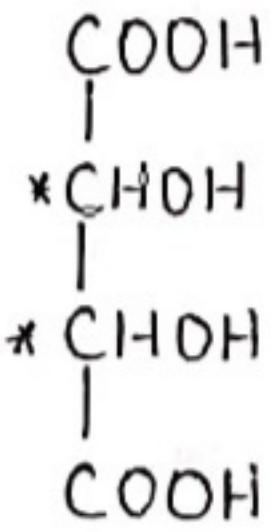
For Degree-I (Hons.)

By-Dr.Rinky ,Dept.of Chemistry, 06-08-2020

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.

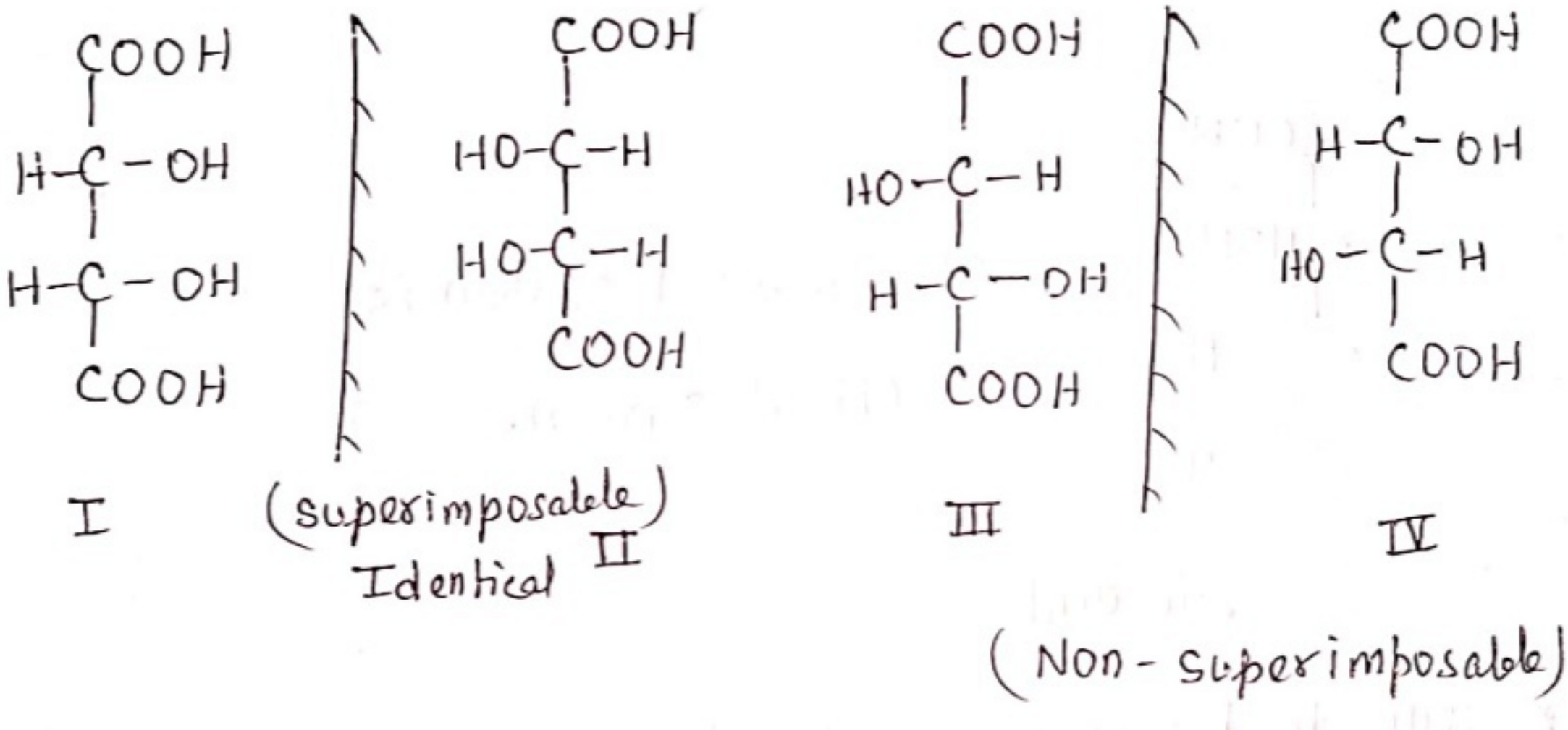
∵ No. of optical isomerism is given by formula 2^n, where n = No. of chiral carbon.

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

isomer in this case is 3. **2.**

* 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.

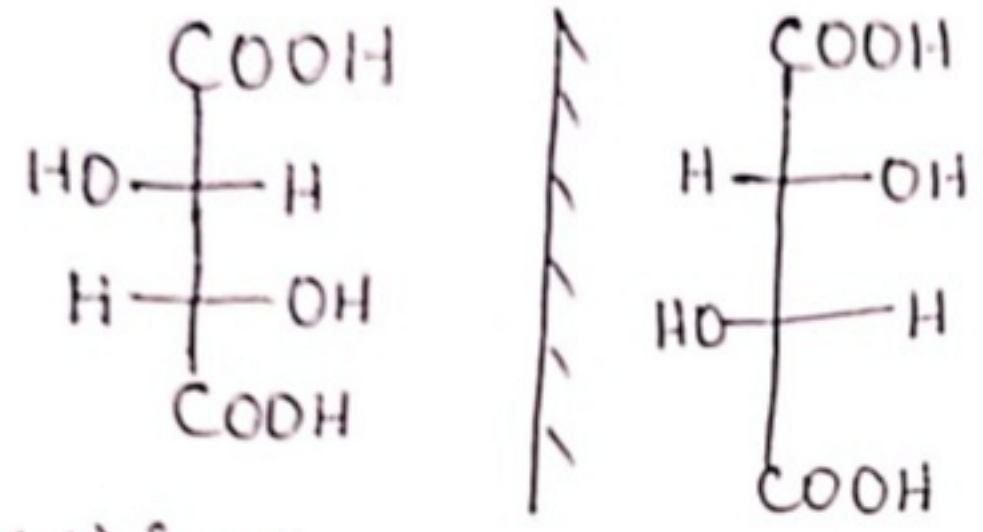


* Since, I & II are super imposable and hence they are identical.

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 (enantiome

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



(+) form

(−) form

Meso form

Enantiomers

b. Acetaldehyde undergoes aldol condensation.

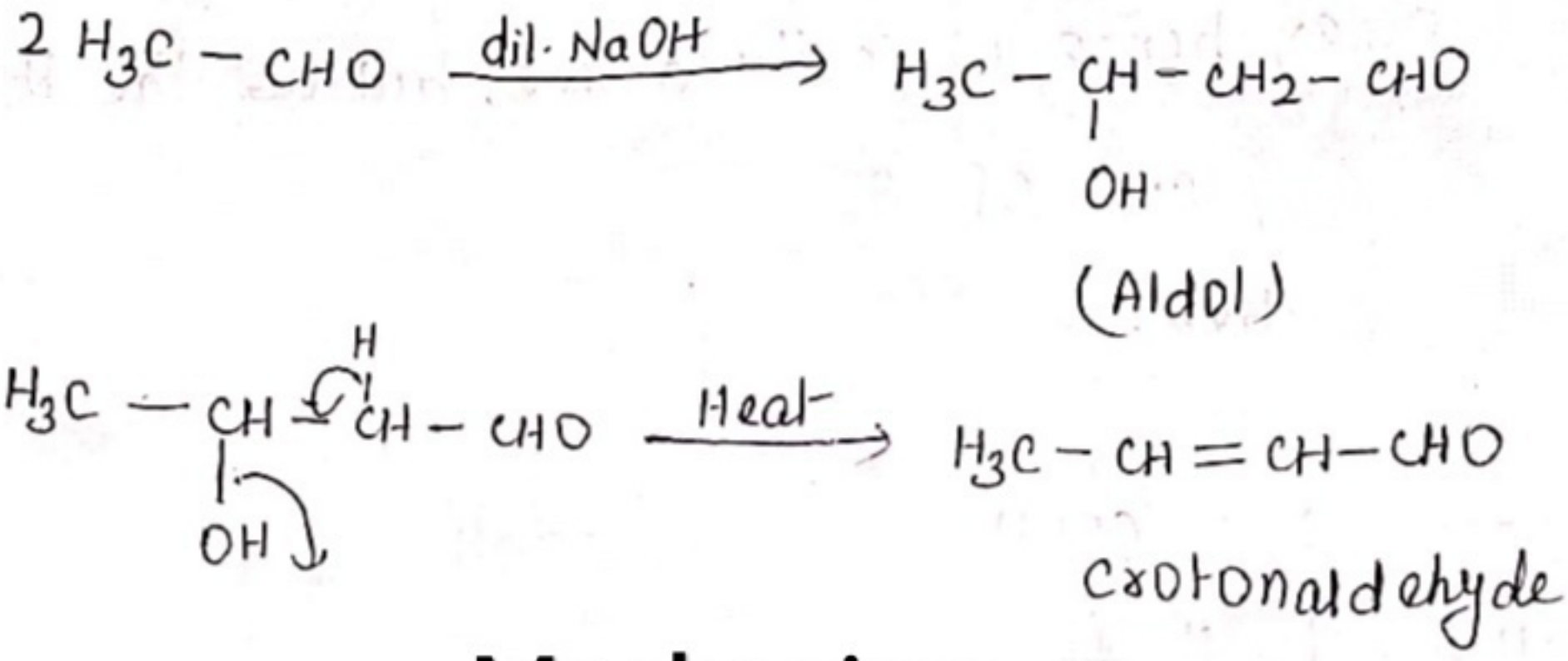
Ans. Aldol condensation reaction is given by aldehyde or ketone having α-hydrogen.

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.

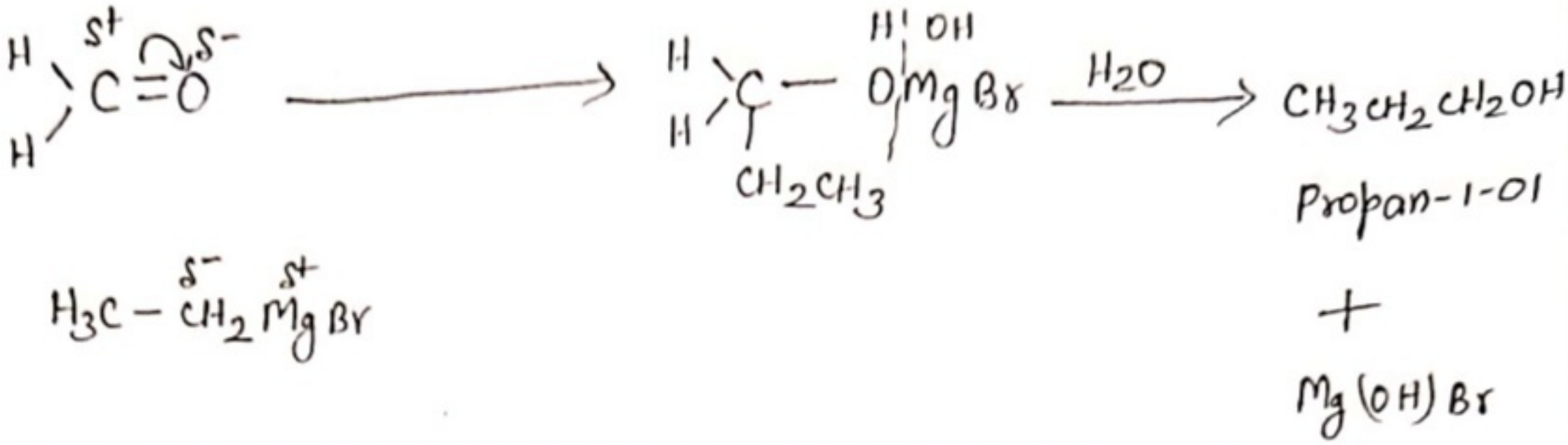

2 H3C – CHO
dil. NaOH
H3C – CH – CH2 – CHO
OH
(Aldol)
Heat
H3C – CH = CH – CHO
Crotonaldehyde

Mechanism

:OH
+ H2O
(Carbanion)
* Carbanion is resonance stabilised.
H3C – CHO
+ H+ from H2O
Heat
H3C – CH = CH – CHO
crotonaldehyde

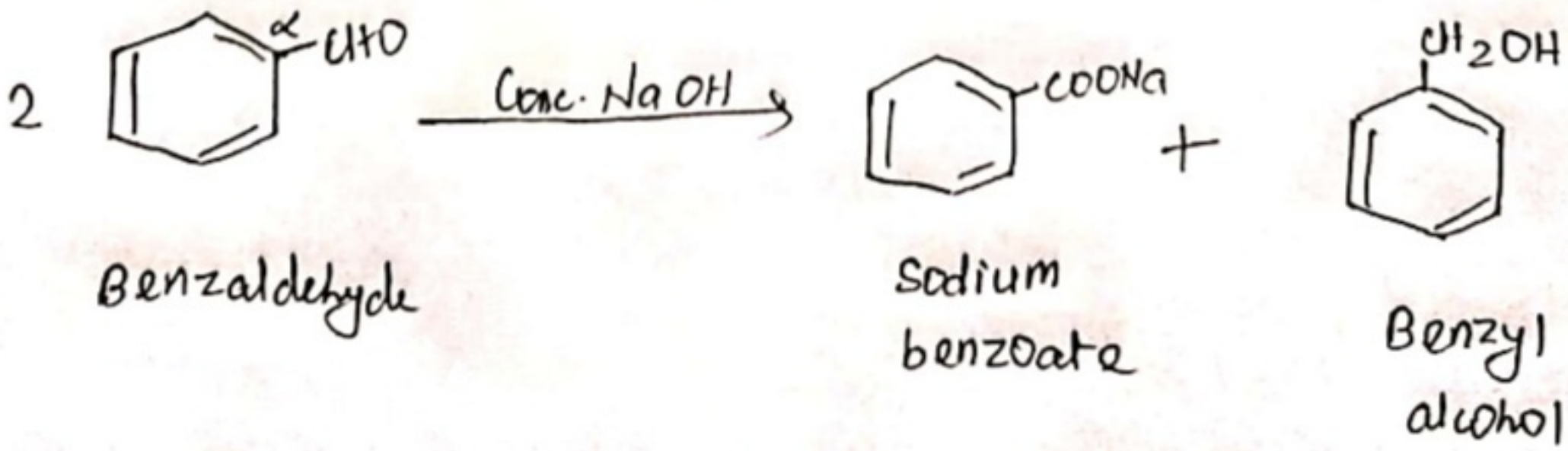
c. Formaldehyde is treated with ethyl magnesium bromide. 5.

Ans. When Formaldehyde is treated with ethyl magnesium bromide followed by hydrolysis it produces propan-1-ol.

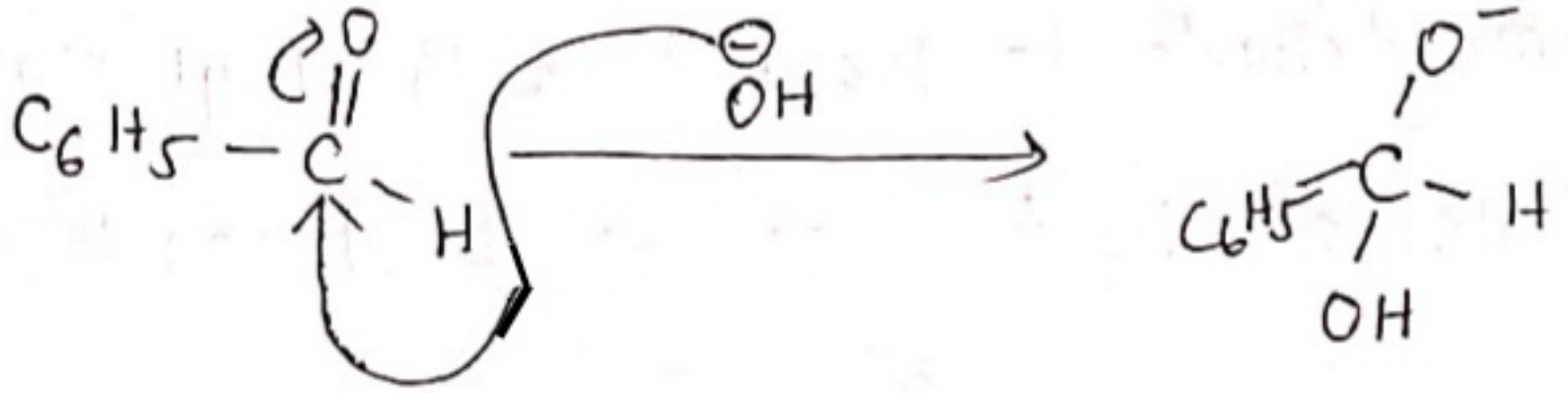


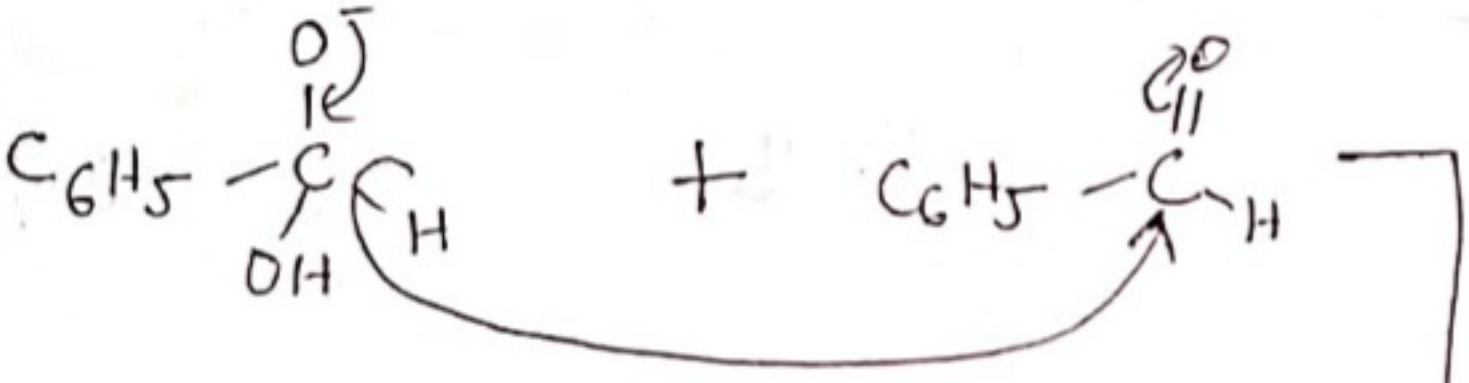
d. Benzaldehyde undergoes Cannizzaro Reaction.

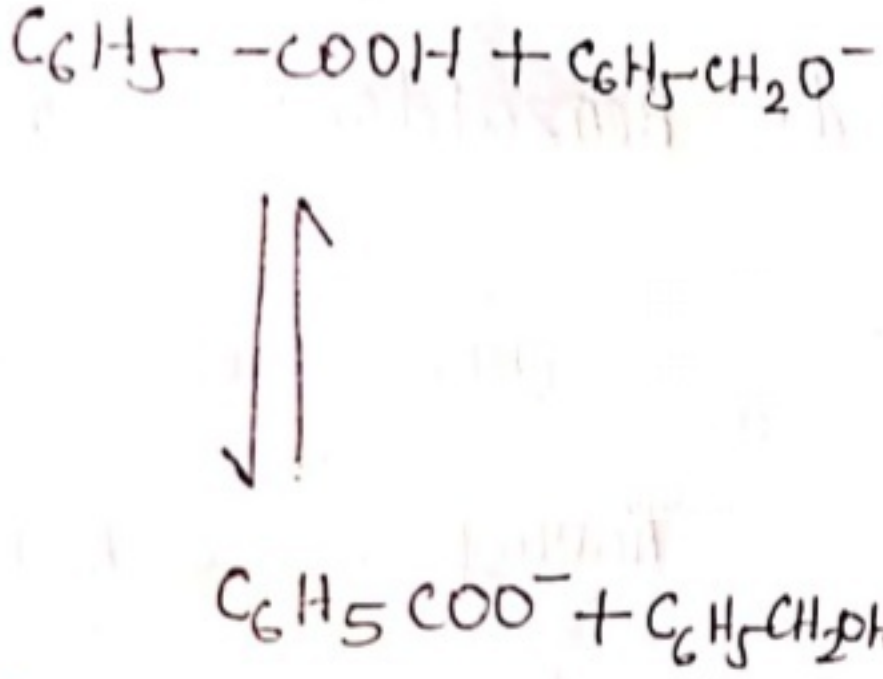
Ans. Cannizzaro reaction is shown by the aldehyde having no α-hydrogen. Since benzaldehyde has no α-hydrogen it gives cannizzaro reaction. In Cannizzaro reaction aldehyde having no α-H when treated with conc. alkali, it disproportionate to corresponding alcohol and sodium or potassium salt of corresponding acid.



6.







~ Completed ~

By-Dr.Rinky Kumari.
Dept.of Chemistry.
J.N.College, Madhubani.

06-08-2020