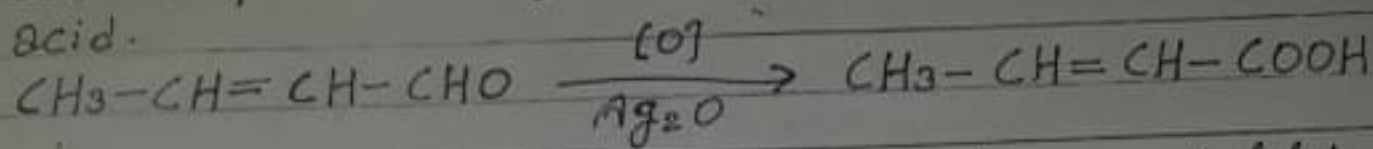


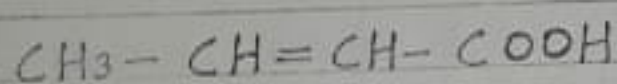
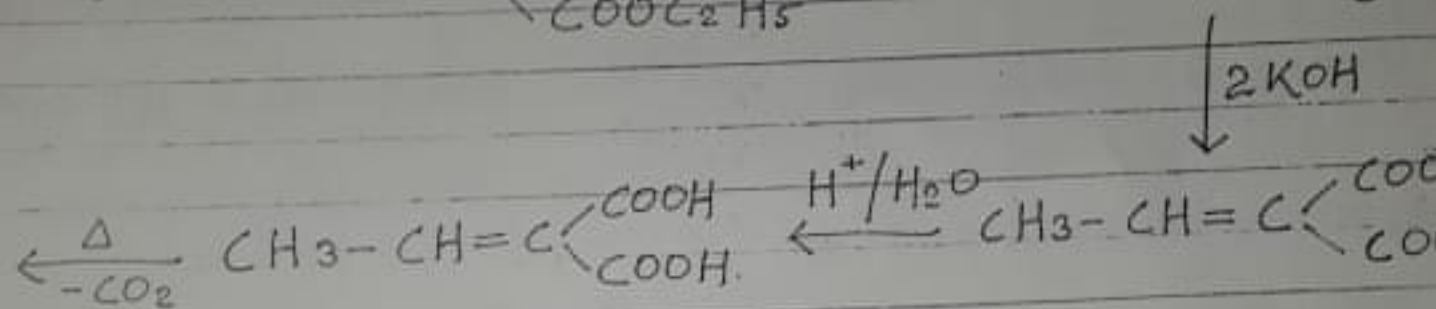
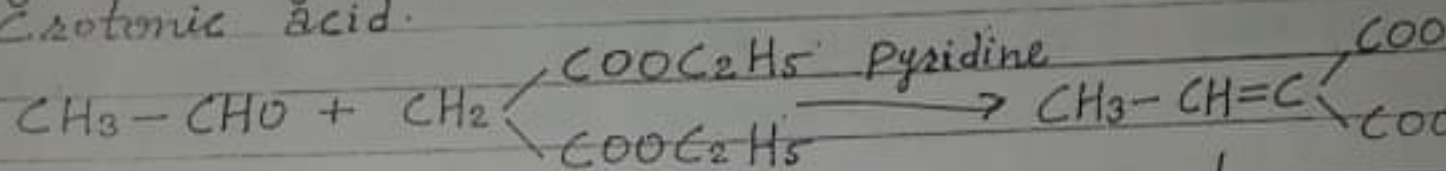
CROTONIC ACID or, Trans-2-butenoic Acid

Methods of Preparation :-

1. When crotonaldehyde is oxidised to give crotonic acid in presence of amm. silver nitrate to give crotonic acid.



2. From Knoevenagel reaction :- When acetaldehyde heated with diethylmalonate in presence of pyridine followed by acid hydrolysis and decarboxylation to give crotonic acid.



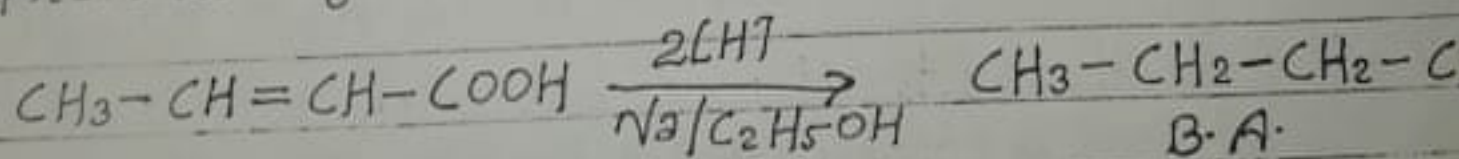
Physical properties :-

1. It is a colourless solid.
2. mp 72°C.

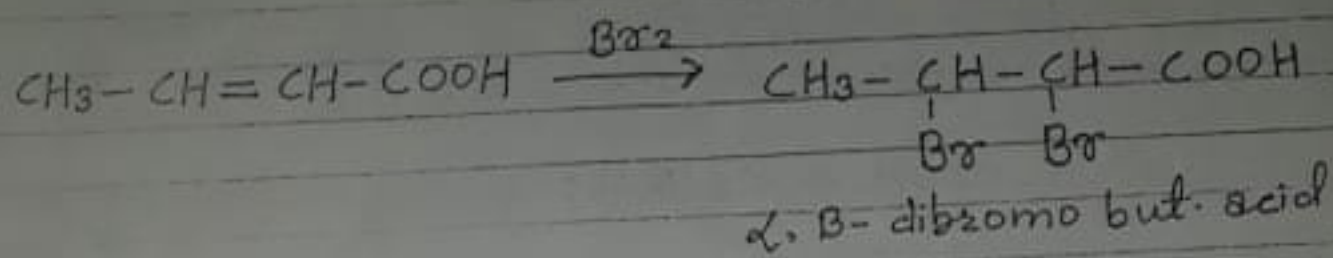
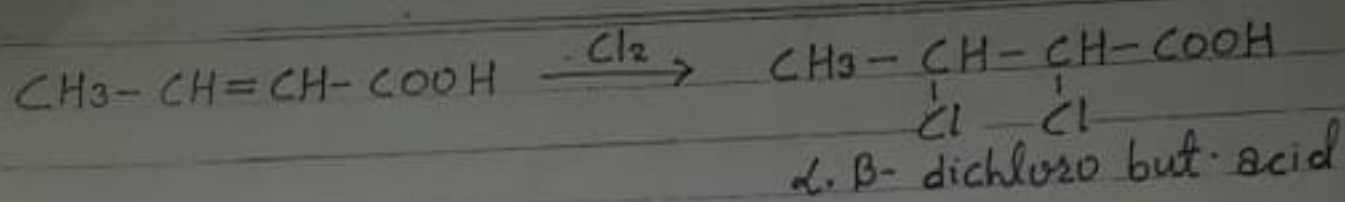
Chemical Properties :-

\* Reaction due to double bond :

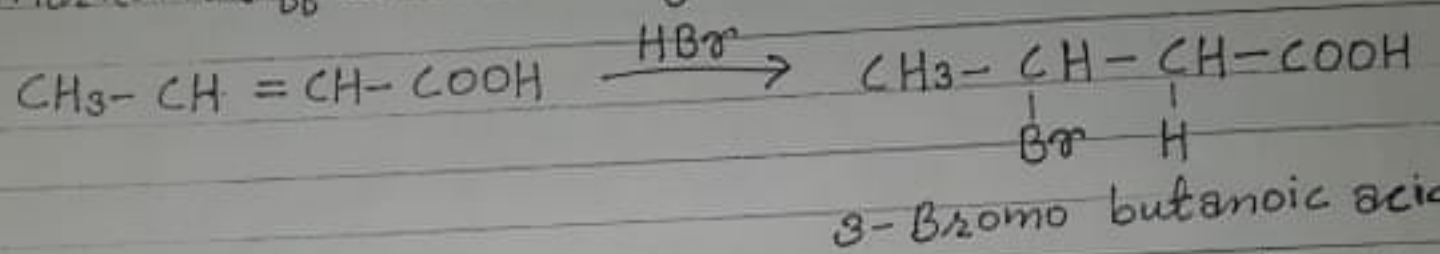
1. Reduction :- When crotonic acid is reduced in presence of Na/C<sub>2</sub>H<sub>5</sub>OH to give butanoic acid.



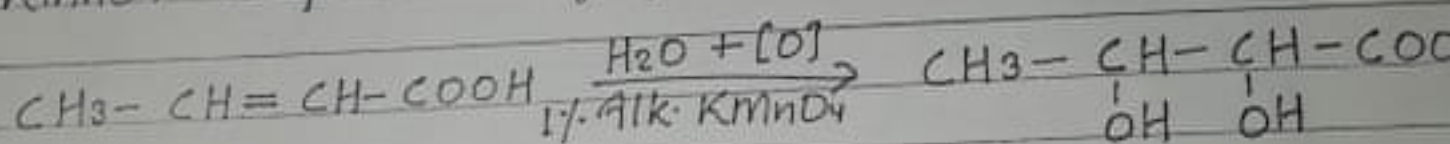
2. Addition of halogens :- C.A. reacts with Cl<sub>2</sub> to give α, β-dihalobutanoic acid.



3. Reaction with hydroacid :- when crotonic acid reacts with halogen acid to give addition product. Markovnikov's rule is not followed.

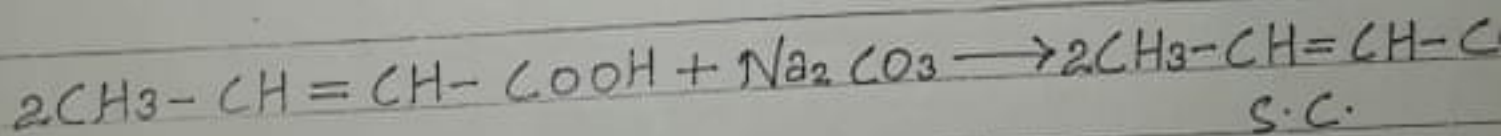
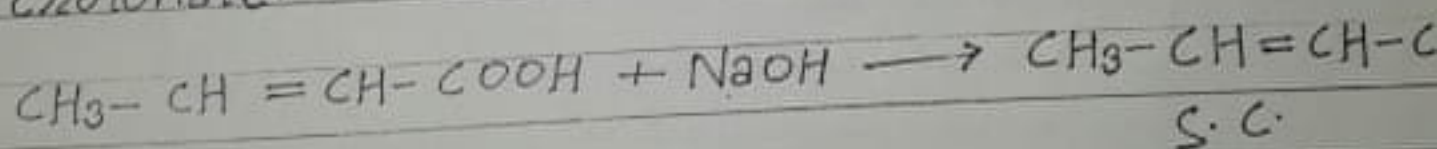


4. Reaction with Alk.  $\text{KMnO}_4$  :- C.A. reacts with alk.  $\text{KMnO}_4$  to give methyl glyceric acid.



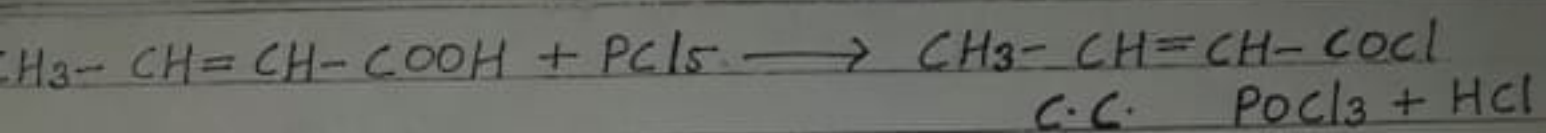
\* Reaction due to acidic group

5. Reaction with  $\text{NaOH}$  and  $\text{Na}_2\text{CO}_3$  :- when C.A. reacts with  $\text{NaOH}$  and  $\text{Na}_2\text{CO}_3$  to give 'sodium crotonate'.



6. Rea<sup>n</sup> with  $\text{PCl}_5$  :- when C.A. reacts with  $\text{PCl}_5$  to give crotonyl chloride

(12)



Reaction with  $\text{C}_2\text{H}_5\text{OH}$  :- When C.A. reacts with  $\text{C}_2\text{H}_5\text{OH}$  to give ethyl crotonate.

