T. D. C. Part II. Chem. (Hons.)
Paper IV ; Gr. B

Unit I, Specification of configurations about a chiral atom :—

To specify the configuration of enantiomers, i.e. Spatial arrangements of groups and atoms about a chiral atom, the following procedure is adopted :—

1. The configuration of the molecule is first drawn on the plane of the paper by Fisher or wedge or Newman projection formulae.

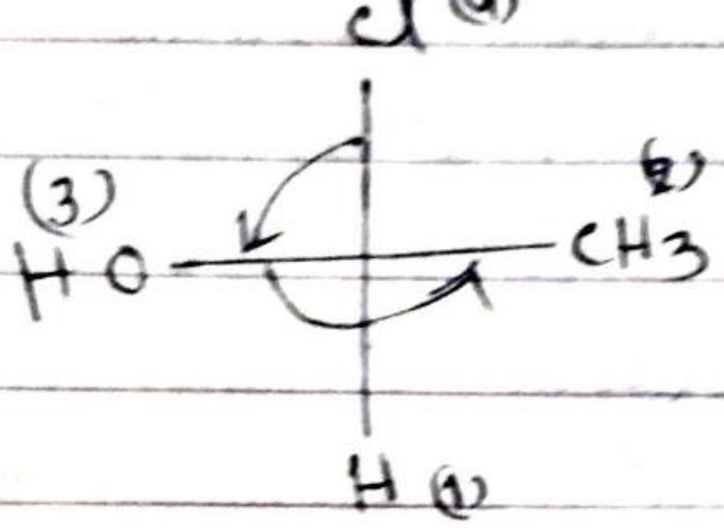
2. Determine the priorities of the substituents. The priorities of the atoms or groups given by numbers within parentheses ; using (i) for the lowest priority and (u) for the highest priority.

3. The lowest priority groups or atoms must project away from the observer and be in the back of the paper, i.e. the lowest priority group or atom must have the lowest vertical position in the projection formula ; if it is not so, the lowest priority group or atom should be brought to that position by making two interchanges.

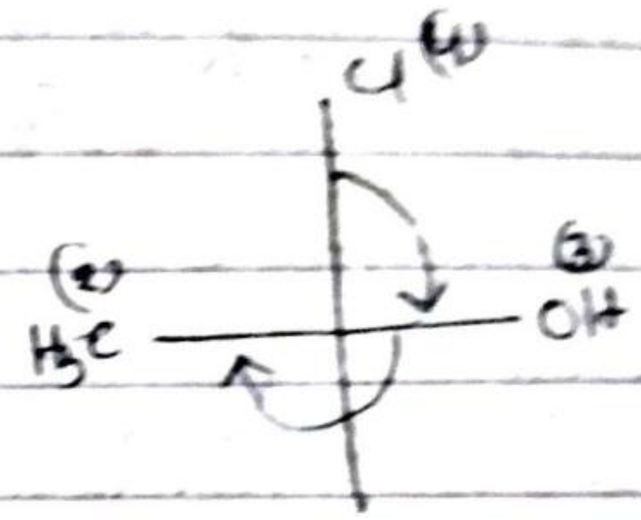
atom is specified as S (if it is the first letter of the word Sinister meaning left); if it is clockwise, the config. of this is designated as R. (it as the first letter of the ~~letter~~ Latin word Rectus. meaning right).

Example → 1-chloroethanol

$CH_3\,CH\,Cl\,OH$
(2) (1) (4) (3).



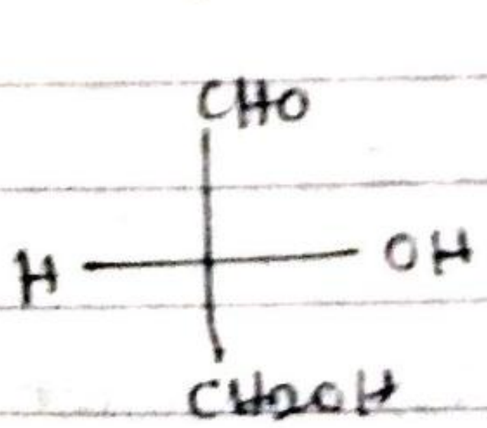

(S) - 1-chloroethanol



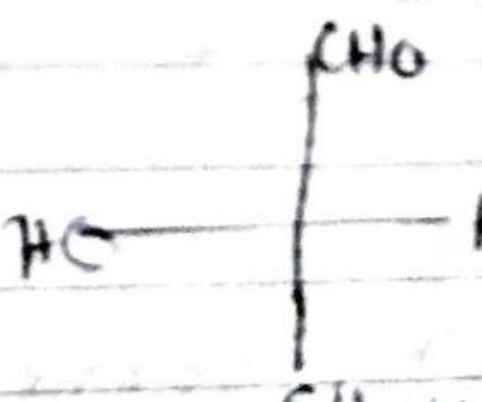

(R) - 1-chloroethanol.

## Absolute configuration :→

Rosanoff proposed that one compound be chosen as a standard and a configuration be arbitrarily assigned to it. The compound chosen was Glyceraldehyde because of its relationship to the sugars.




(+) or D - Glyceraldehyde



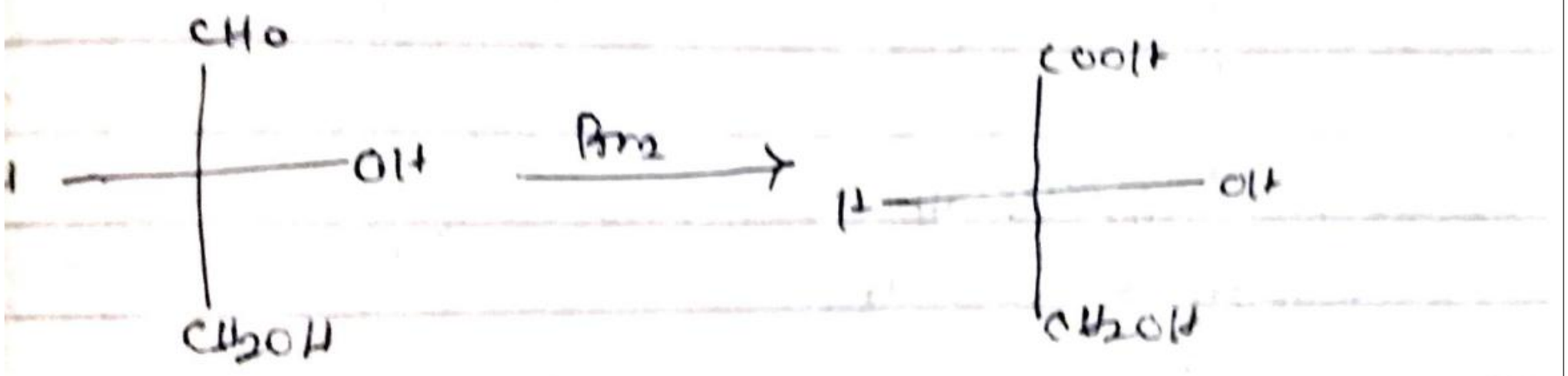

(−) or L - glyceraldehyde

Arbitrarily the form I of glyceraldehyde ~~i.e its chiral C is of D configuration~~ and the is designated as D-glyceraldehyde i.e its chiral C is of D configuration and the form II is specified of L-glyceraldehyde However D and L-glyceraldehyde may be specified by R and S as shown below




Thus D-glyceraldehyde is (R)-glyceraldehyde and L-glyceraldehyde is (S) glyceraldehyde

If a species is obtained from or ~~stereo~~ converted into D- glyceraldehyde by a reaction or reactions without breaking any bond in a chiral atom, it is said to be of D- configuration. Similarly if L- glyceraldehyde is converted into or obtained from a species without ~~geometry~~ undergoing any bond breaking process or a chiral c. the configuration of the species is specified as L. Thus D and L are relative configurations taking D- and L- Glyceral -dehydes as standards of reference respectively. For example the glyceric acid obtained from D- glyceraldehyde using bromine as an oxidising agent is designated as D- glyceric acid.




D- glyceraldehyde

D- glyceric acid

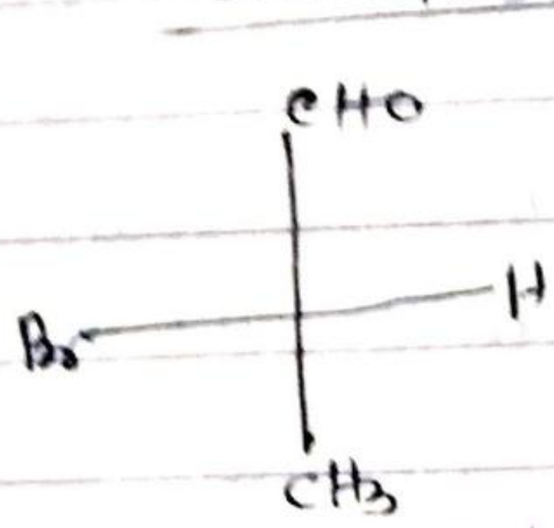
configurational nomenclature of compounds containing chiral c's using D- and L- as notations →

The c's of the main ~~chain~~ c- chain are placed on the vertical line with the ~~C~~ at the top and the last c at the bottom; others are placed ~~sequentially~~ at the crossing point in the Fischer projection formula. Any hetero-

atom or group that lie on the right side of horizontal line is thus designated as D - and that on the left is designated as L.

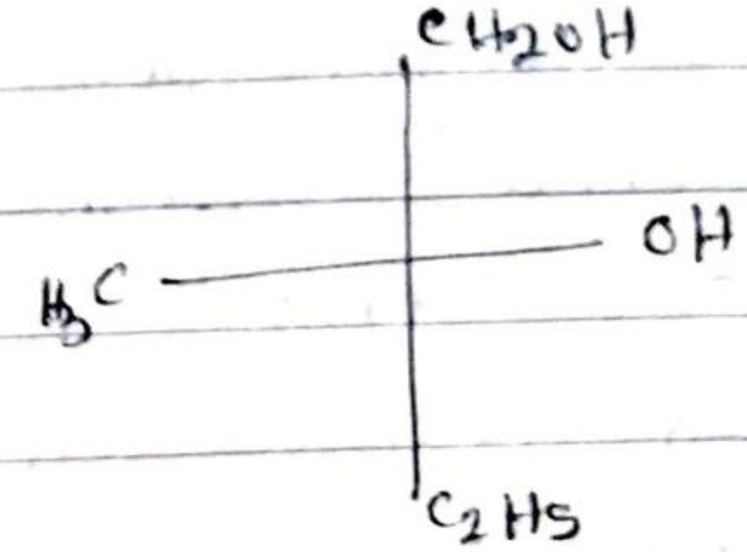
Examples

(a)




2L bromopropanal

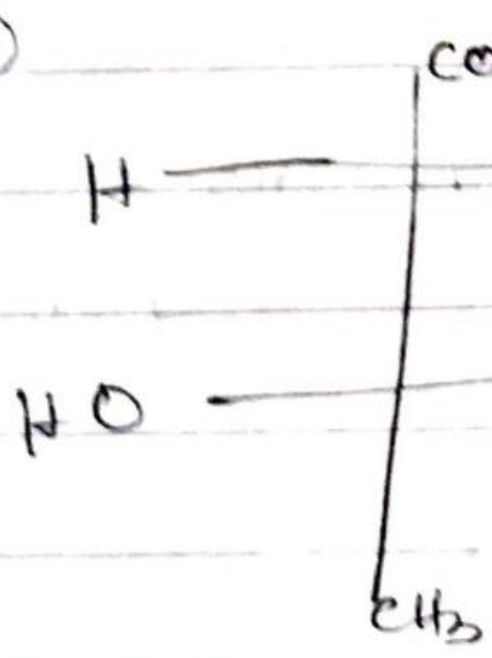
(b)




$\overset{1}{C}H_2OH\ {}^{*}\overset{2}{C}HMe\ OH\ \overset{3}{C}H_2\overset{4}{C}H_3$

2L-methylbutane-1,2-D-diol

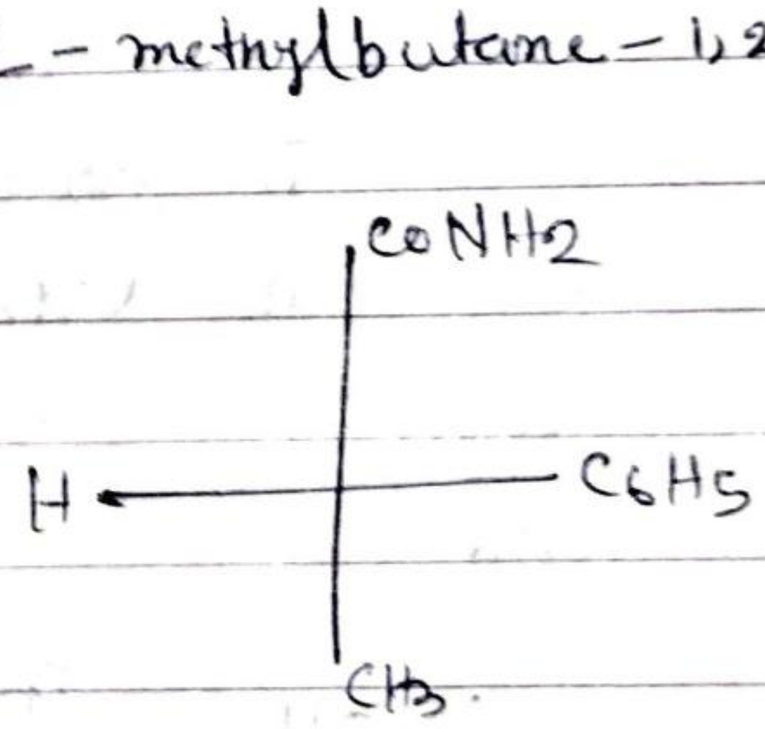
(c)




$\overset{1}{C}OOH\ {}^{*}\overset{2}{C}H\cdot Br\ {}^{*}\overset{3}{C}H\cdot OH\ \overset{4}{C}H_3$

2D-bromo-3L-hydroxy butanoic acid.

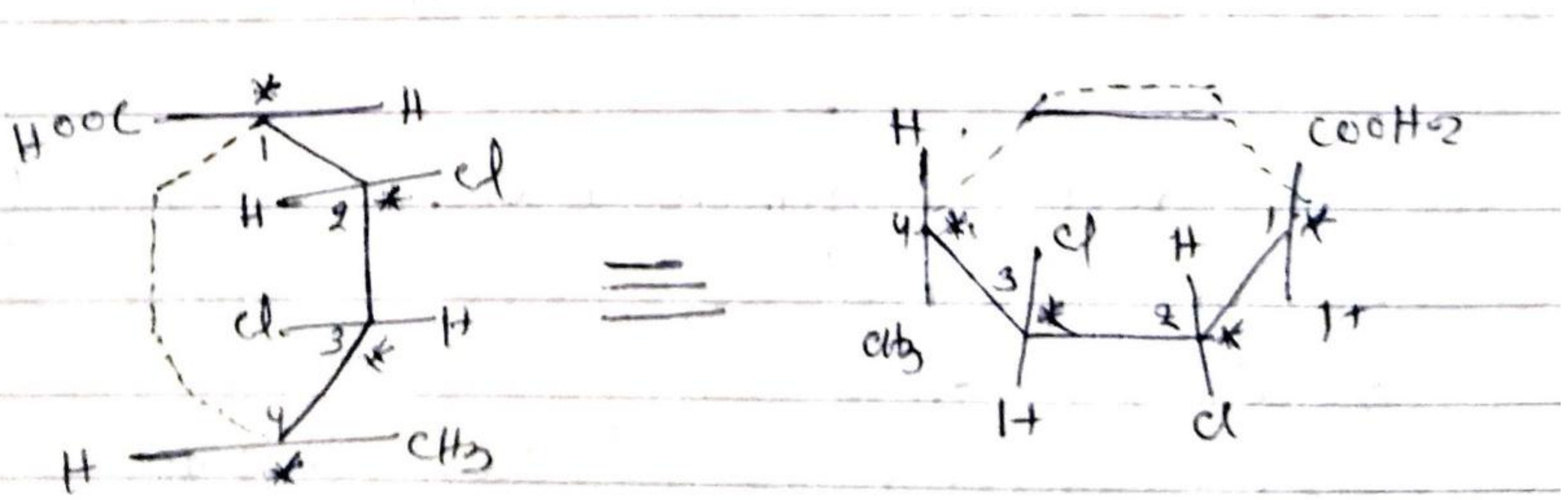
(d)




$\overset{3}{C}H_3\ {}^{*}\overset{2}{C}H\cdot C_6H_5\cdot \overset{1}{C}ONH_2$

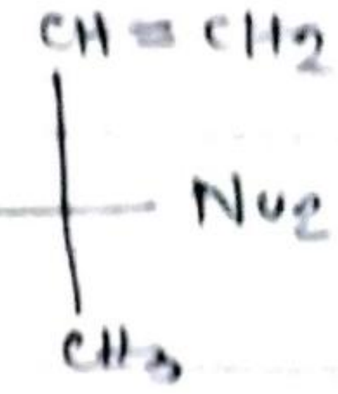
2D-Phenylpropanamide

(e)

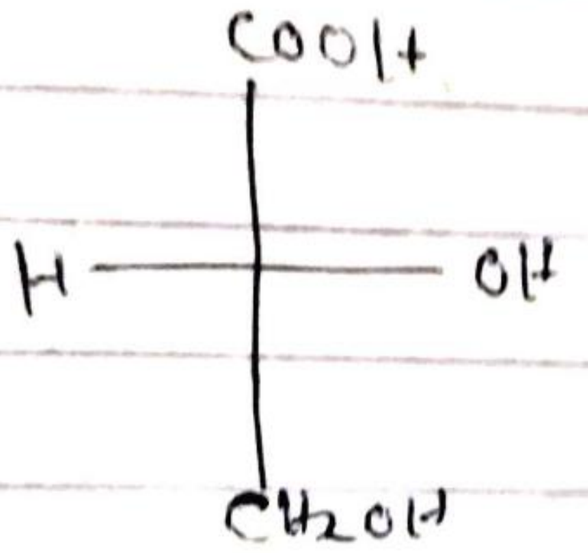



2D,3L-dichloro-4-D-methyl(-

Ques — Designate the following compounds as R or S.

(a) D-Glyceric acid (b) 


(c) L-Lactic acid.

Ans (a) 


D-glyceric acid

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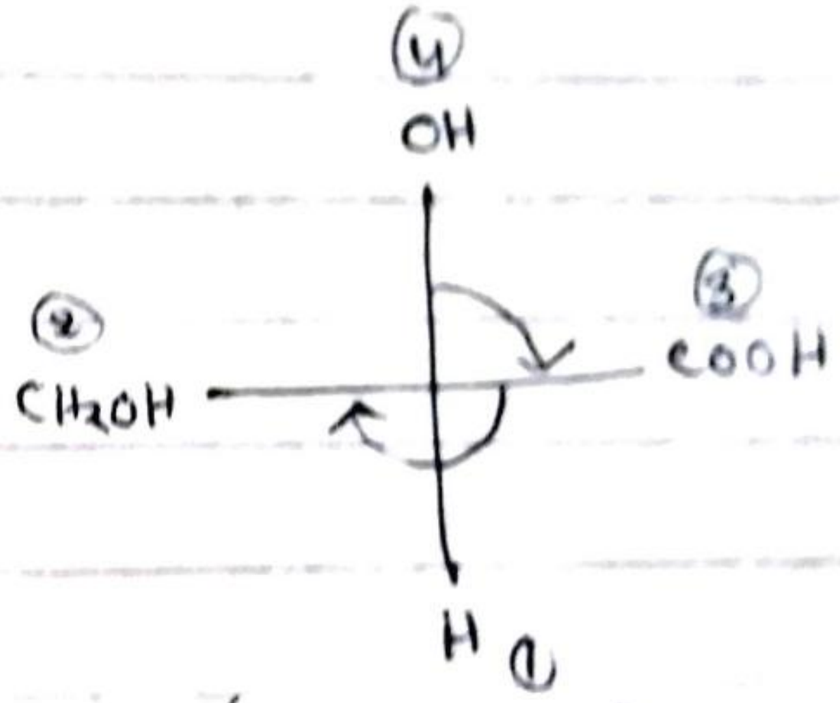
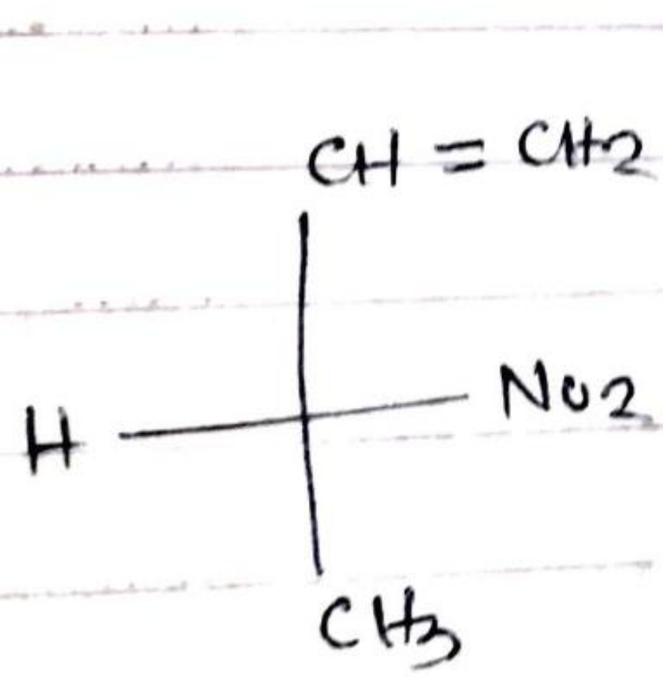



(clockwise) R

(b) 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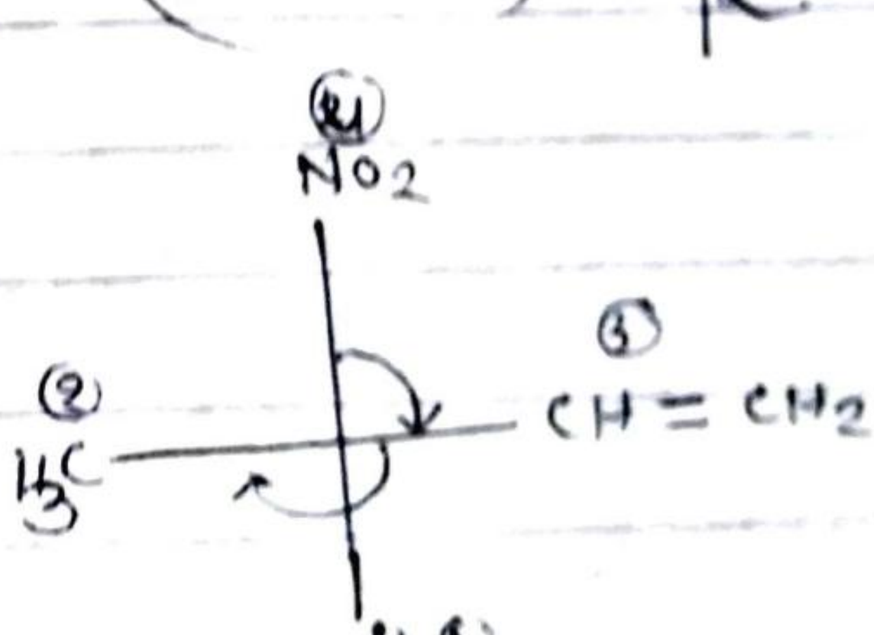
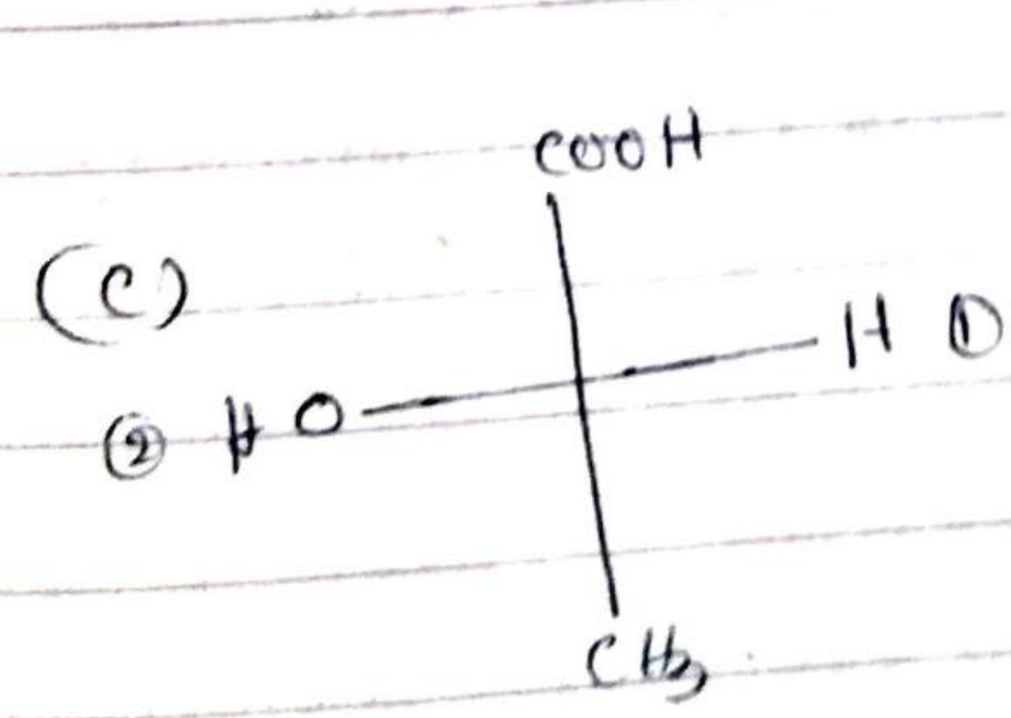



(R)

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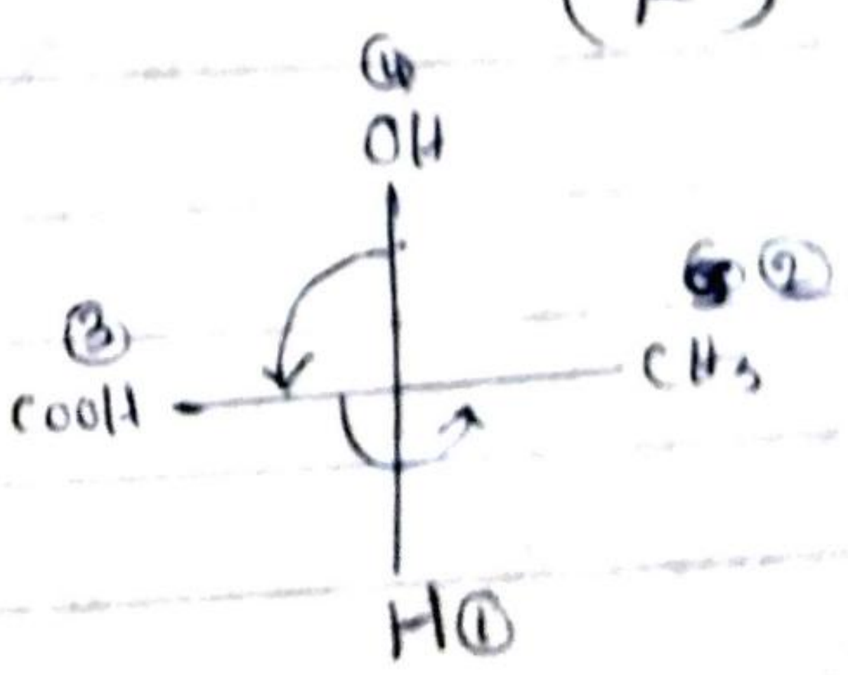


∴ L-lactic acid

S.