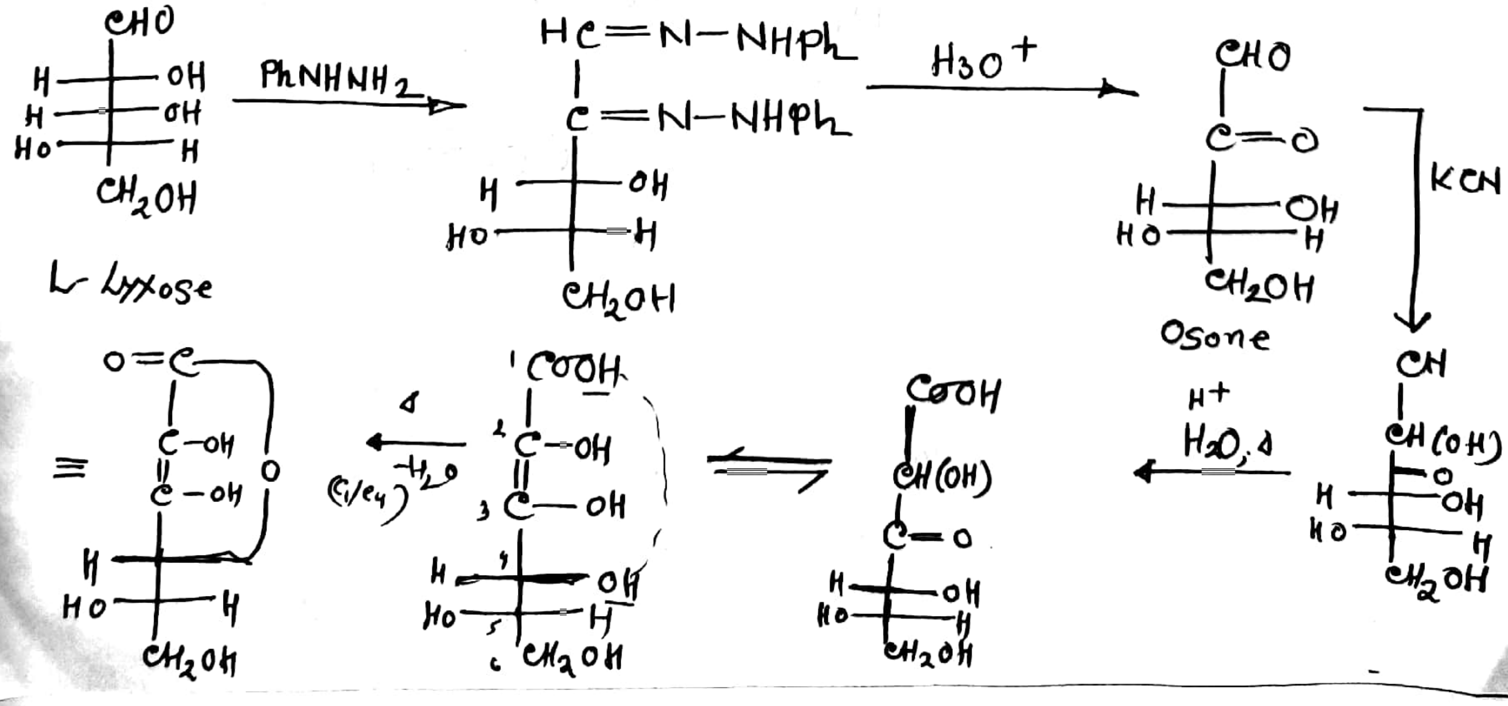
# Carbohydrate

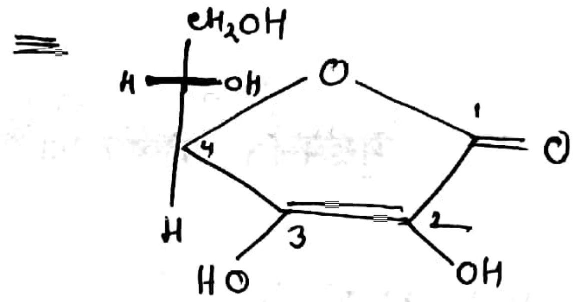
1. Calculate the sp. rotation of invert sugar which contains an equal amount of D(+) glucose and D(-) fructose. Given $[\alpha]_D^{25°C}$ of D(+) glucose = +52.4° (at equilibrium) and that of D(-) fructose is -92.4° (at equilibrium) $[\alpha]_D^{25°C}$ for sucrose is +66.5°

Sinnce one molar of sucrose Produces one molar of D(+) glucose and one molar of D(-) fructose. The sp. rotation of sucrose is the half of the sum of sp. rotation of D(+) glucose and D(-) fructose

∴ The sp. rotation of inveret sugar $= \frac{1}{2}(+52.4° - 92.4°)$
$= -20°$.

2. Give Haworth method of the synthesis of L(+) ascorbic acid (vitmin C) from L-lyxose.

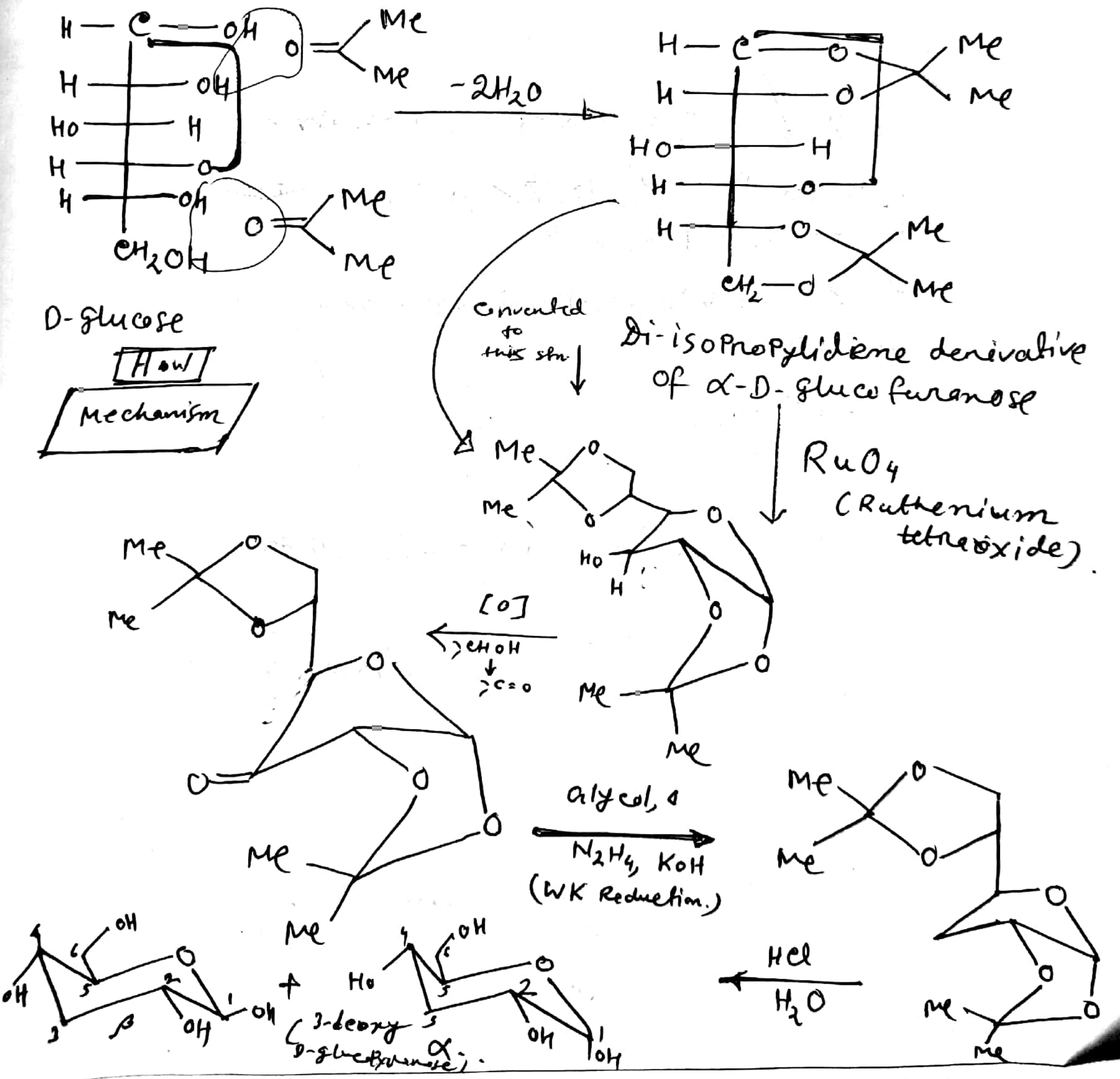




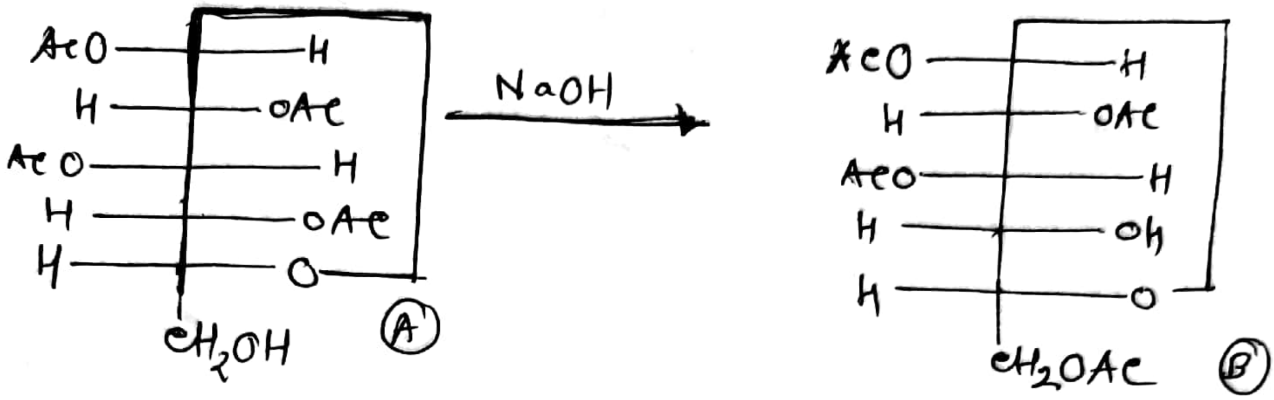

L-ascorbic acid
(Haworth structure)

3. The rexn Product of D-glucose and acetone, 1,2:5,6-di-O-isopropylidine α-D-glucofuranose, is a valuable synthetic intermediate. Suggest a way in which this di-isopropylidine derivative can be used to synthesize 3-deoxyglucopyranose.

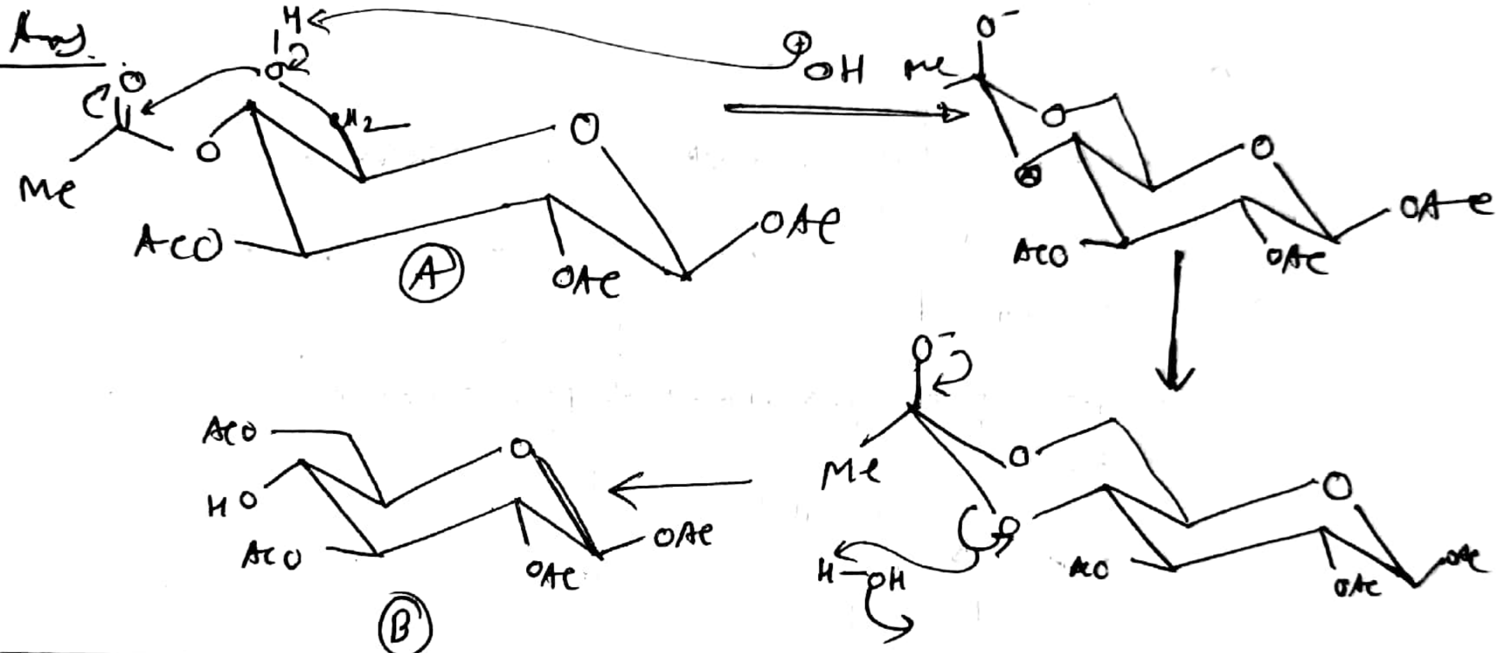
Ans.



(4) Give the mechanism of the following transformation:-

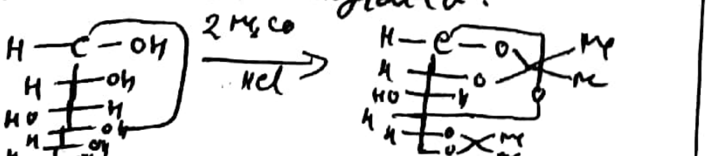


Ans



(5) Di-O-isopropylidene derivative of D-glucose but not that of D-galactose can be alkylated at C-3 position, explain.

In case of glucose C-1, C-2 OH's are cis to each other. Again C-5 and C-6 terminal $CH_2OH$ group are structurally flexible to react with acetone so often formation di-O-isopropylidene derivative, C-3 OH remains free to be alkylated.



In case of D-galactose di-O-isopropylidene derivative is formed through α-D pyranose form where C-1/C-2 and C-3 C-4 OH's are cisoid. Thus C-3-OH is not free to be alkylated. Structures are shown here.