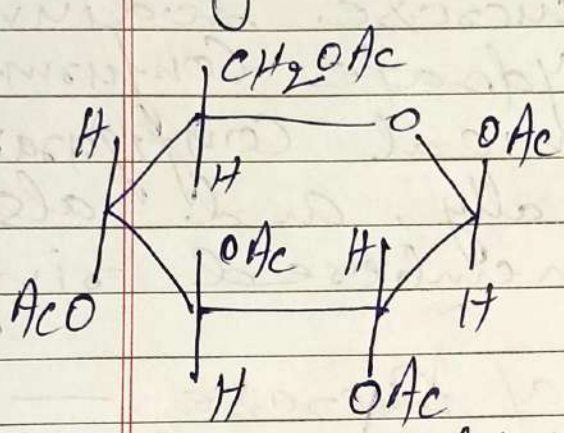
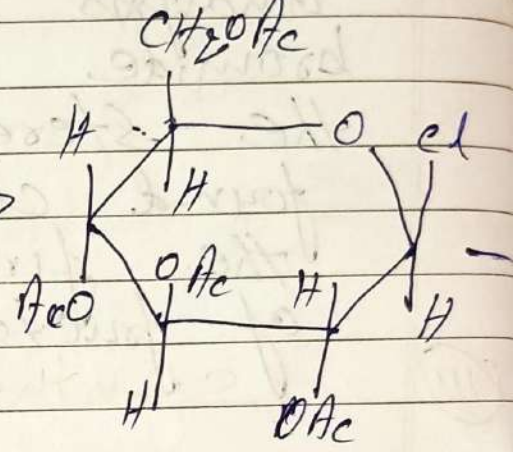
Synthesis of Sucrose :—

Lemieux (1950) Synthesized Sucrose by heating 1,2-anhydro-α-D-glucopyranose-3,4,6-triacetate VI with D-fructofuranose. 1,3,4,6-tetra-acetate, VII in a sealed tube at 100° for 104 hours. The product, Sucrose hepta-acetate. VIII was acetylated to the octa-acetate by means of

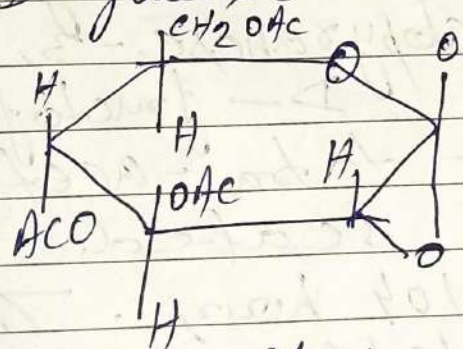
acetic anhydride - sodium acetate in benzene solution. The solvent benzene was evaporated off and the residue deacetylated with methanolic sodium methoxide to give sucrose.



Tetra-O-acetyl-β-D-glucose

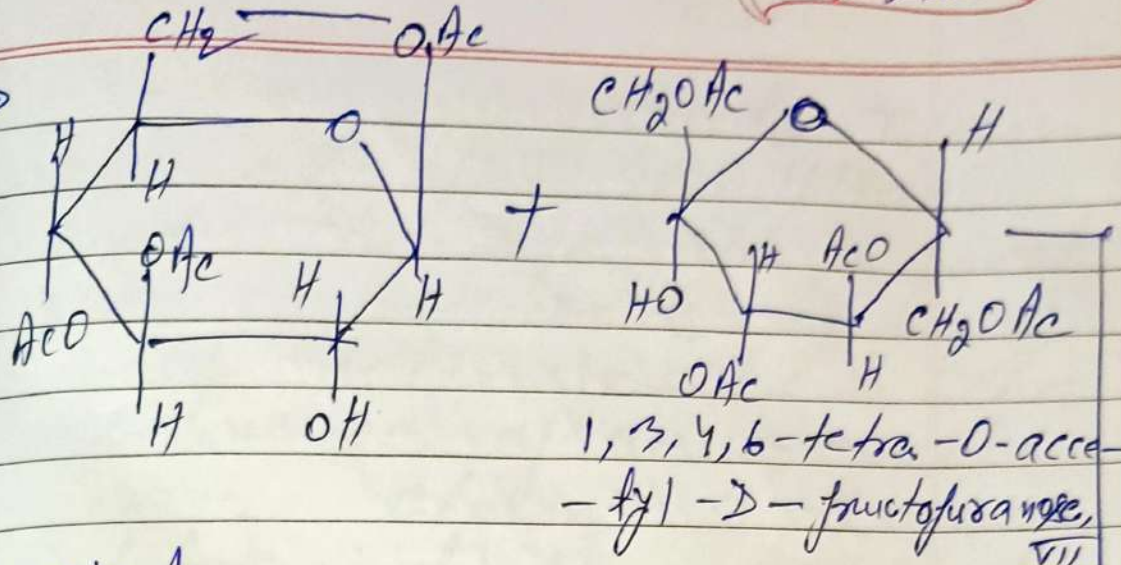


(i) NH_3 in ether
(ii) NH_3 in benzene

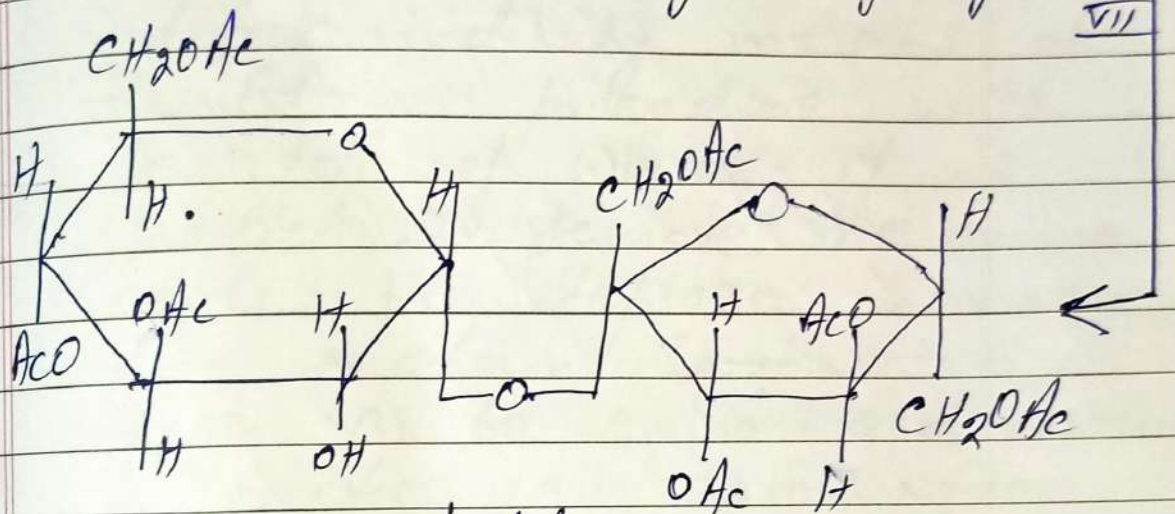


opening of the oxide ring

1,2-Anhydro-α-D glucopyranose 3,4,6-triacetate, VI



1, 3, 4, 6-tetra-O-acce-tyl-D-fructofuranose, VII



Sucrose hepta-acetate.

During the opening of the oxide ring in Compound VI, the CH_2OAc group at position 6 enters into neighbouring group participation, and thus shields this side from attack by fructopyranose molecule. Thus the latter molecule is forced to attack from the other side which gives the desired α-glucopyranose linkage.