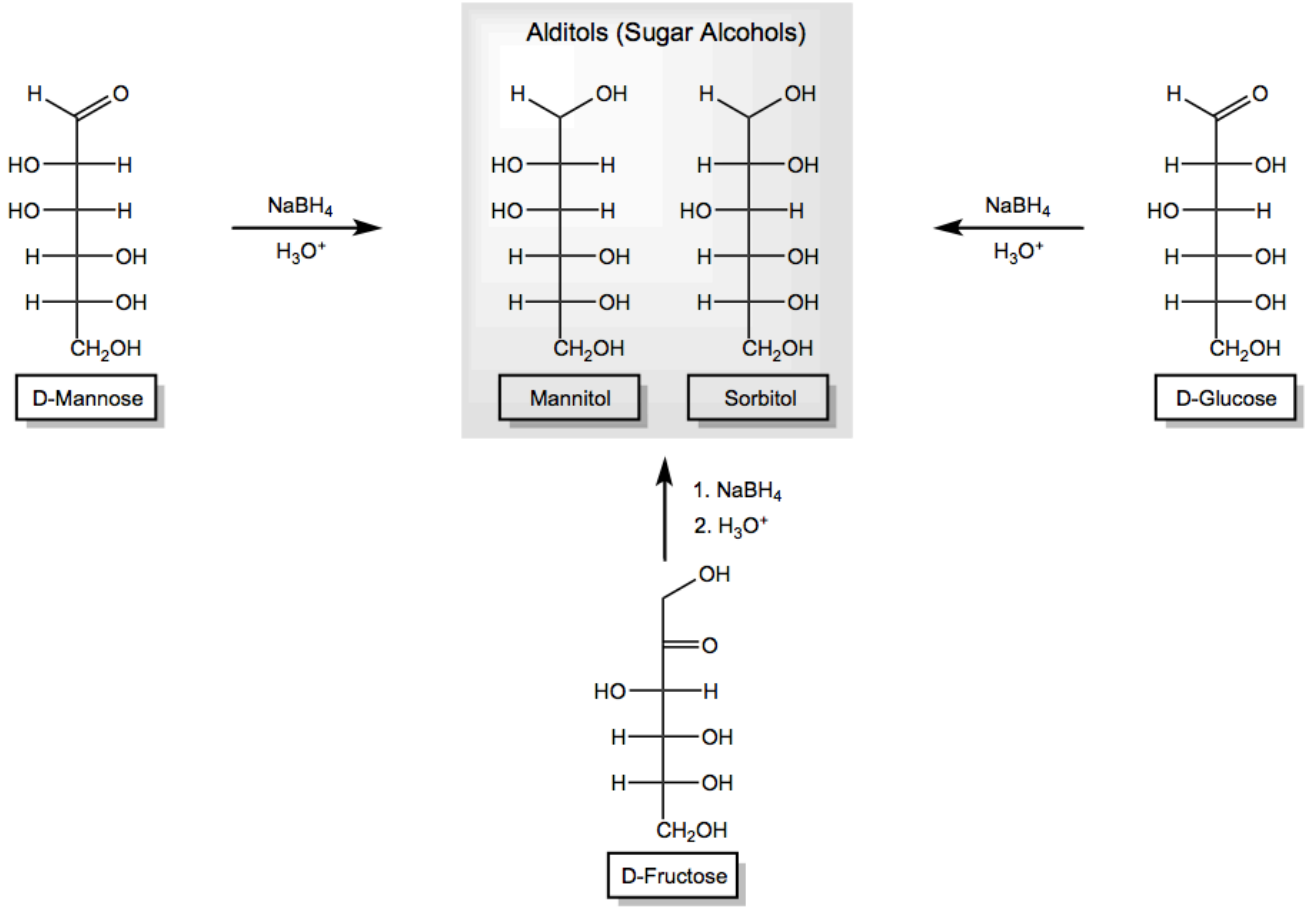
CONCEPT: MONOSACCHARIDES – REDUCTION (ALDITOLS)

As polyols with carbonyls, monosaccharides can undergo a series of oxidation and reduction reactions.

● Reduction of a monosaccharides produces polyols known as ***alditols*** or *sugar alcohols*

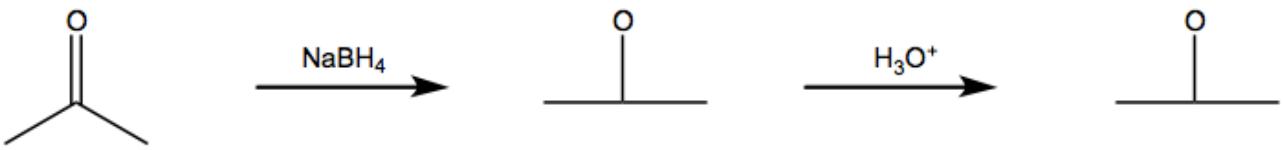
□ Alditols are used industrially as sugar substitutes, food thickeners, and in medicine mostly as laxatives



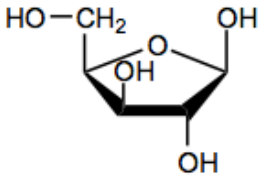
● Whereas reduction of aldoses produces one product, reduction of ketoses forms ____ products due to C2 racemization

General Mechanism:

$NaBH_4$ acts as a hydride donor and attacks the carbonyl via *nucleophilic addition*, then protonation occurs.



PRACTICE: Determine the structure of the alditol formed when b-D-xylofuranose is treated with $NaBH_4$ and then water. Explain how $NaBH_4$ can reduce the hemiacetal group of the furanose.



β-D-xylofuranose