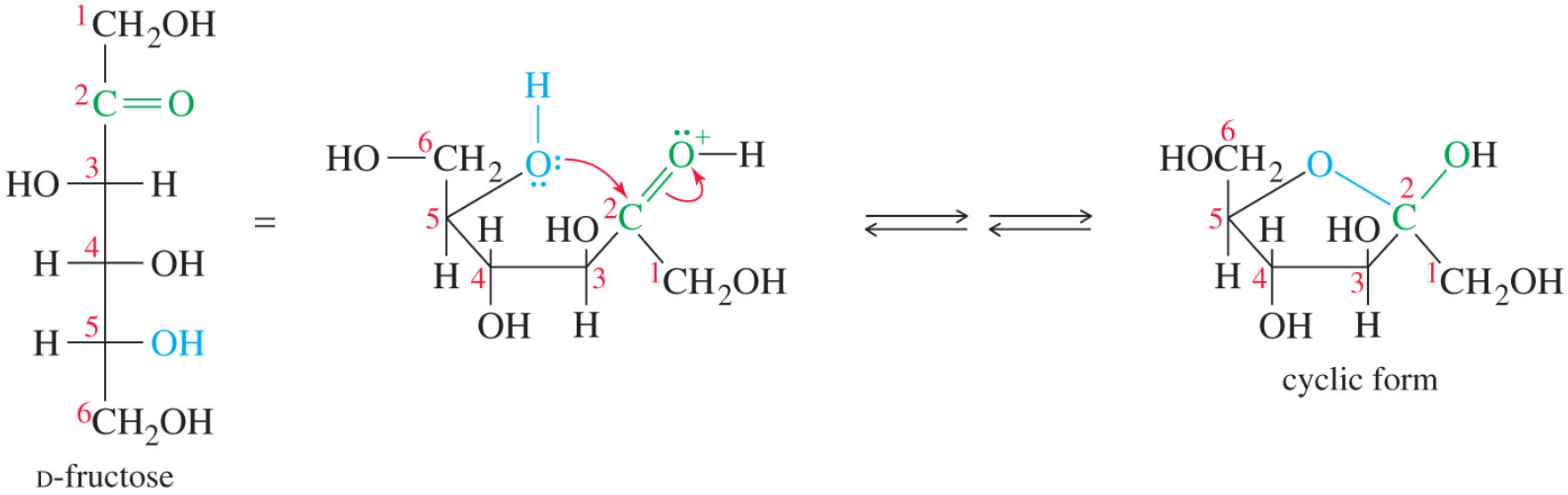
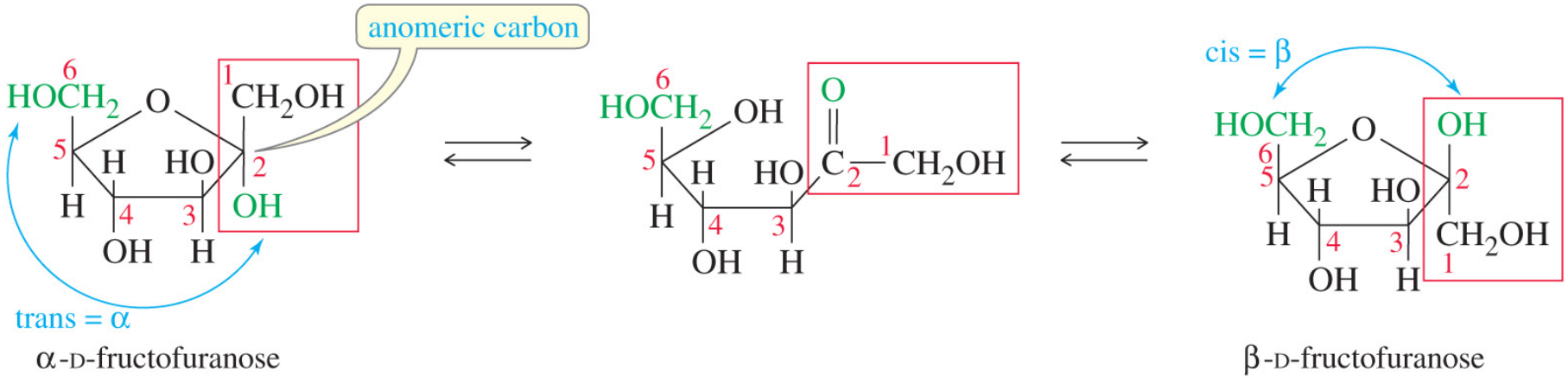
Cyclic Structure for Fructose



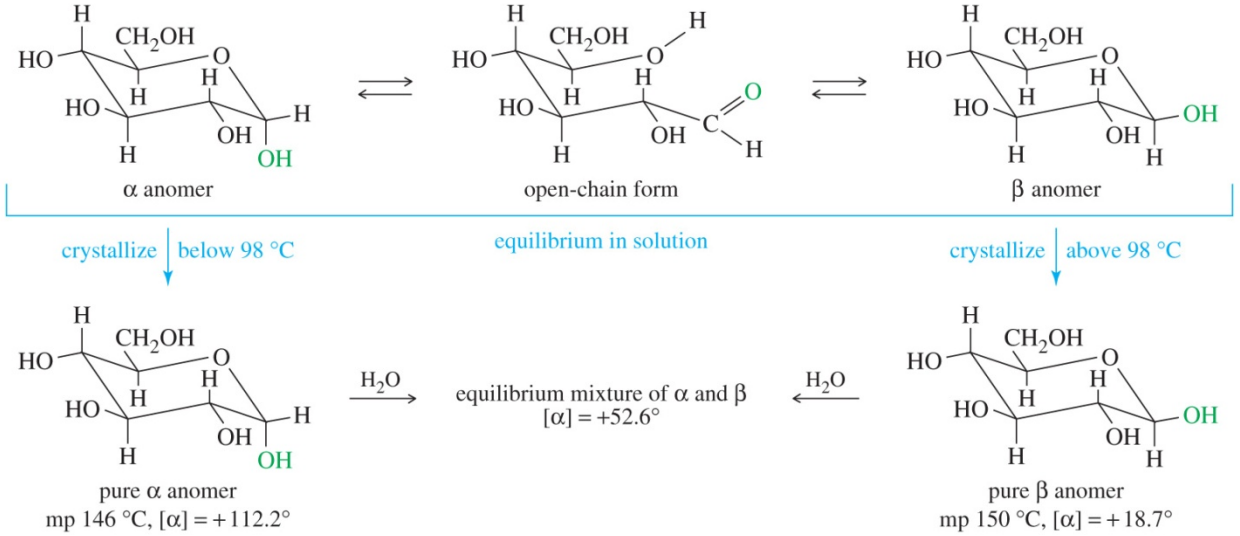
- Cyclic hemiacetal formed by reaction of C═O at C2 with —OH at C5.
- Since five-membered rings are not puckered as much as six-membered rings, they are usually depicted as flat Haworth projections.

Anomers of Fructose



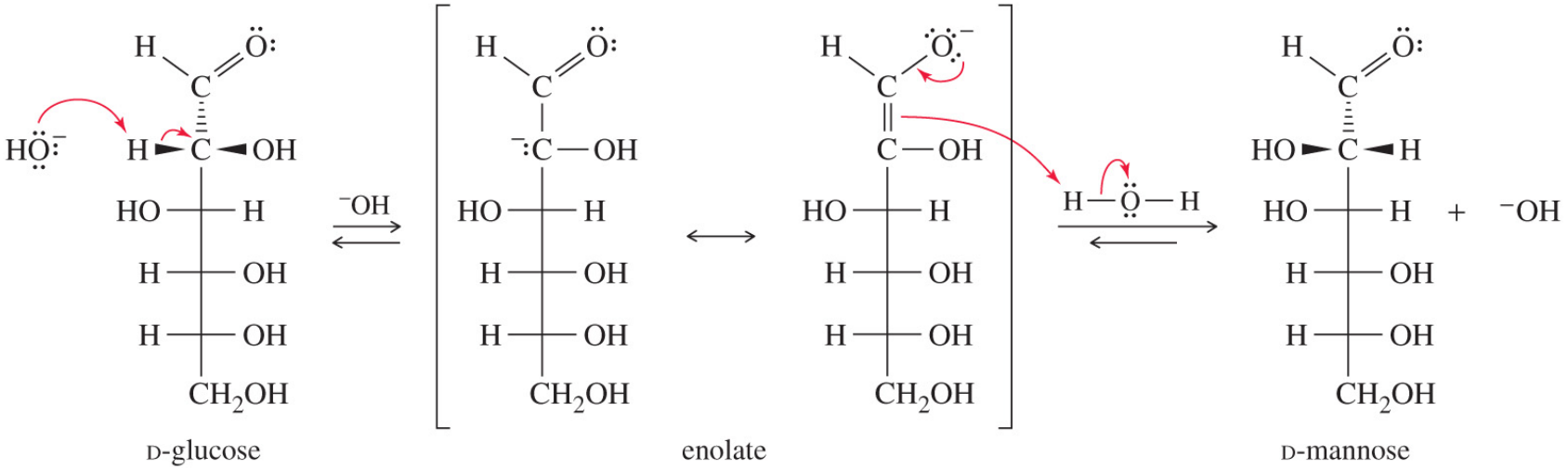
- The α anomer of fructose has the anomeric —OH group down, trans to the terminal —CH_2OH group.
- The β anomer has the anomeric —OH group up, cis to the terminal —CH_2OH.

Mutarotation



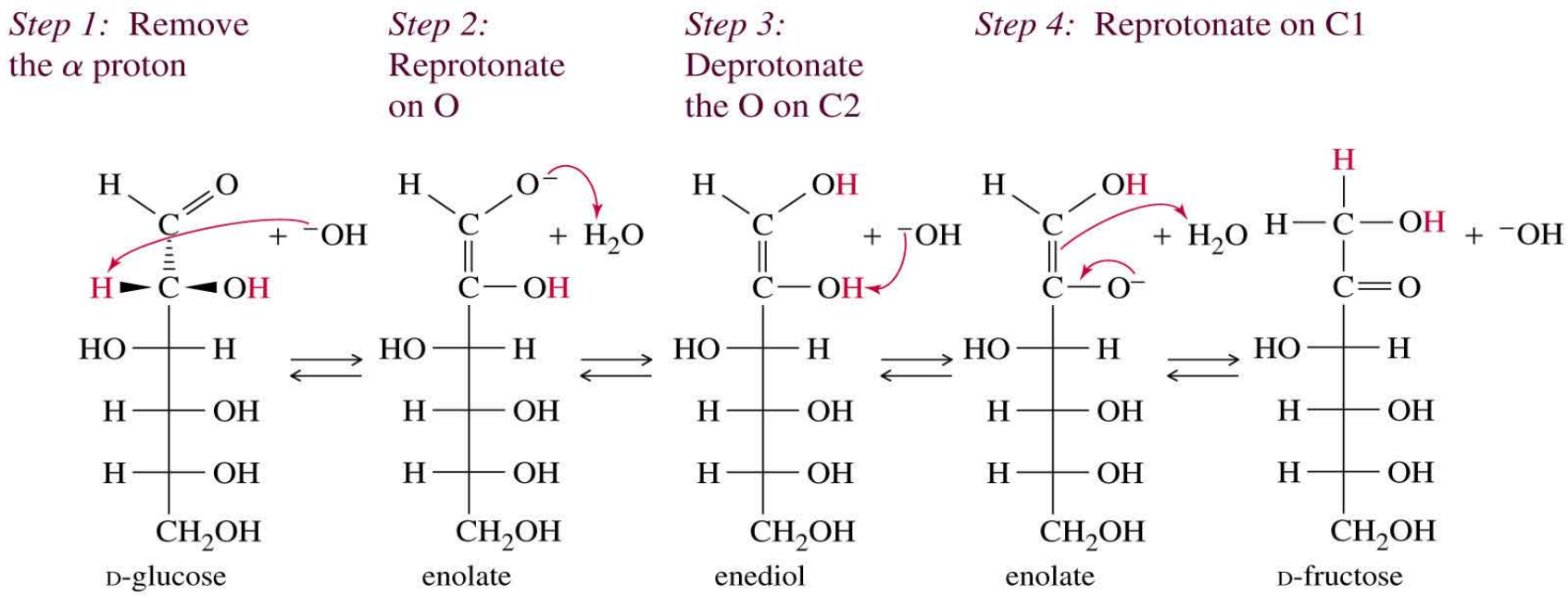
- An aqueous solution of D-glucose contains an equilibrium mixture of *α*-D-glucopyranose, *β*-D-glycopyranose, and the intermediate open-chain form.
- Crystallization below 98°C gives the *α* anomer, and crystallization above 98°C gives the *β* anomer.

Base-Catalyzed Epimerization of Glucose



- Under basic conditions, stereochemistry is lost at the carbon atom next to the carbonyl group.
- The enolate intermediate is not chiral, so reprotonation can produce either stereoisomer.
- Because a mixture of epimers results, this stereochemical change is called ***epimerization***.

Enediol Rearrangement



- In base, the position of the carbonyl can shift.
- Chemists use acidic or neutral solutions of sugars to prevent this rearrangement.