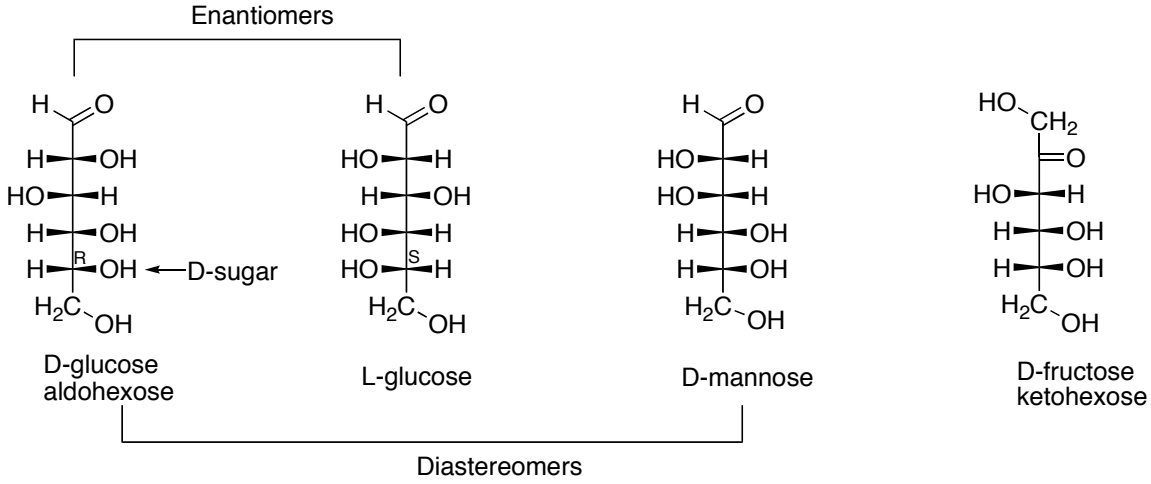
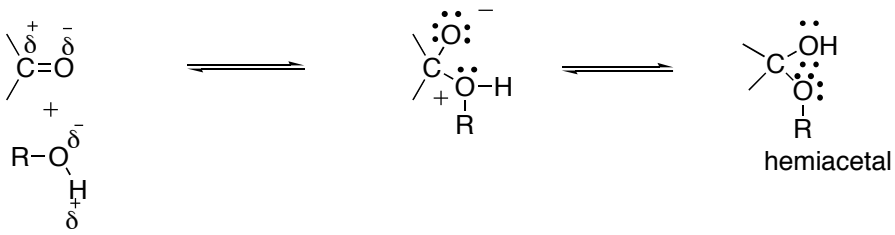
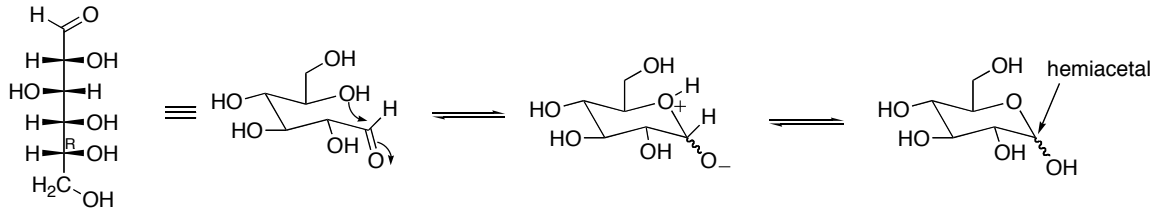
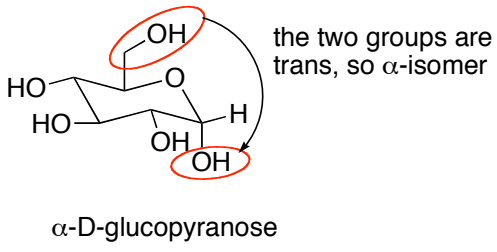
i) **Isomers of monosaccharide:**



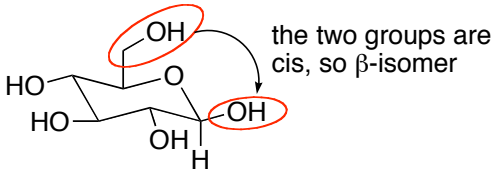
ii) **Hemiacetal formation:**







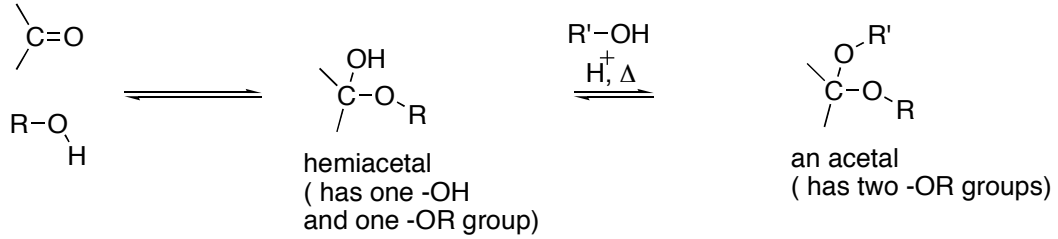
α-D-glucopyranose



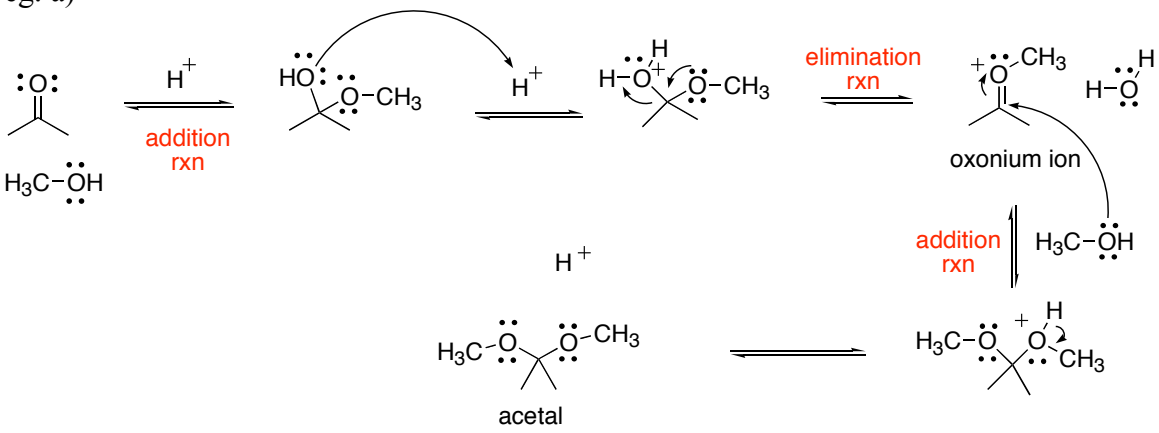
β-D-glucopyranose

* in the above case, the hemiacetal formation could give both isomers (α and β), depending on which face of the carbonyl is attacked. Usually α favoured (anomeric effect)

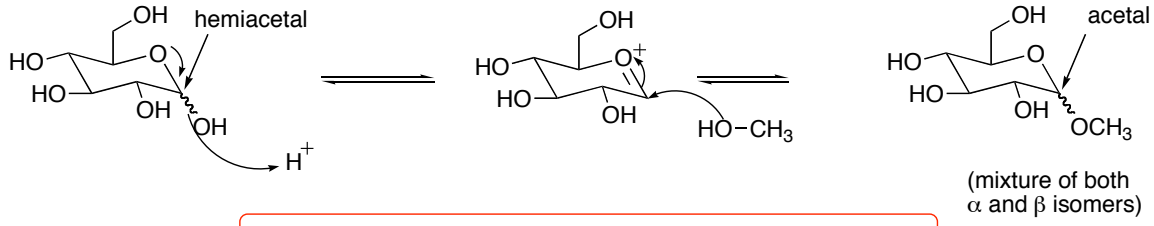
iii) **Acetal formation:**

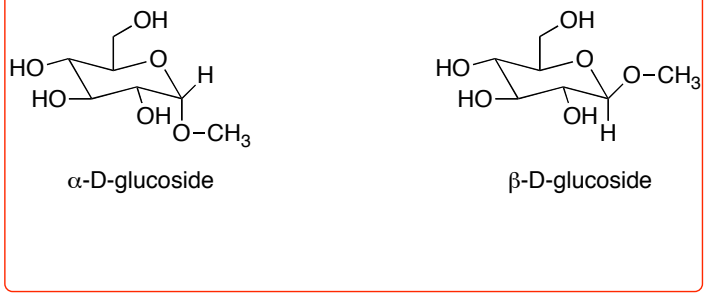


eg. a)



b)

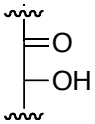




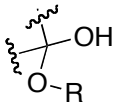
iv) **Classification:**

Reducing sugars:

aldehyde



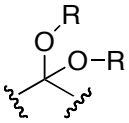
a hydroxy ketone



hemiacetal

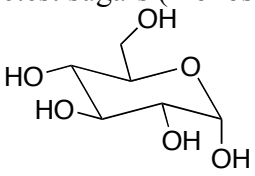
Non-reducing sugars

- all other sugars
- acetal

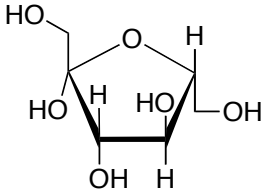


v) **Taste and Sweetness:**

Two of the sweetest sugars (monosaccharide)



α-D-glucose (pyranose)
pyranose = 6 ring sugar



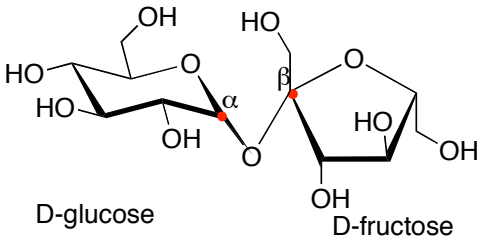
D-fructose (furanose)
furanose = 5 ring sugar

vi) **Polymers of Sugars:**

- polysaccharides ~ oligosaccharides (small polymers of sugars)
    - 2 sugar units = disaccharide

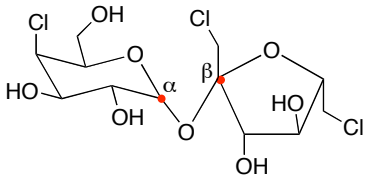
- 3 sugar units = disaccharide
  etc….!

- Sucrose – disaccharides (glucose + fructose)

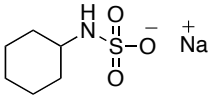


α-D-glucopyranosyl-β-D-fructofuranoside

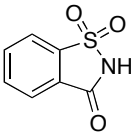
→some more examples of sweet compounds:



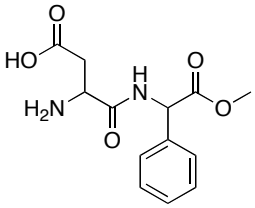
Sucralase = splenda
600x sweeter than sucrose



Sodium cyclamate

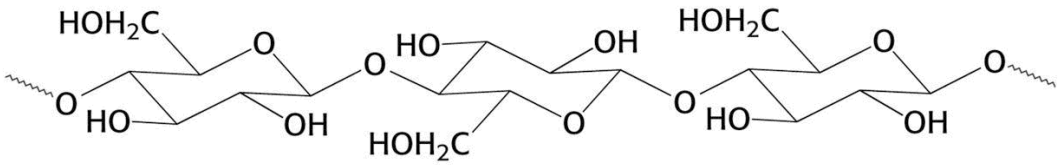


Saccharin

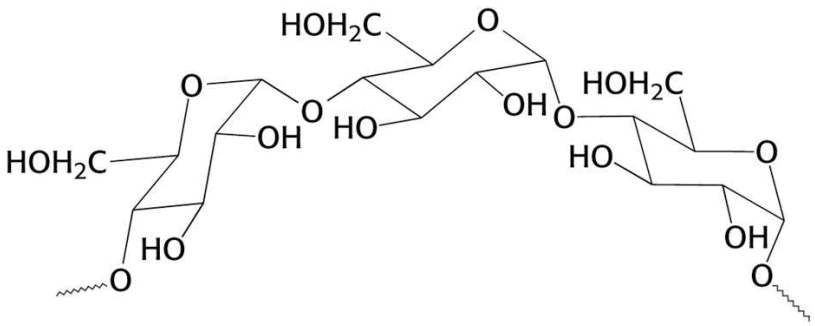


Aspartame

→ sugar polymers:
- Cellulose (cotton, paper)
- Starch (linear chain is amylose, branched network of polymer is glycogen)



Cellulose
(β-1,4 linkages)



Starch and Glycogen
(α-1,4 linkages)

Amylose, a component of starch has linear α-1,4 linkages as shown above; amylopectin in starch has additional α-1,6 linkages crosslinking the chains into sheets, as does glycogen – see pages 1108 and 1109 of Solomons' Organic Chemistry text