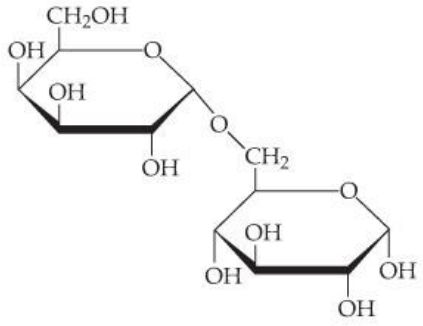
Naming glycosidic bonds

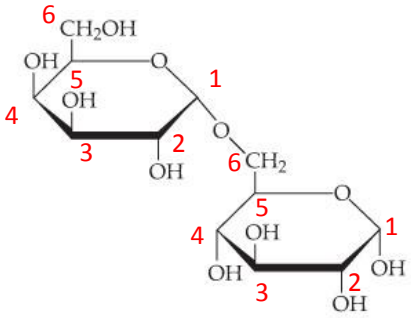


Melibiose

When naming glycosidic bonds, there are two things that must be identified:

- the alpha/beta designation of all anomeric carbons involved
- the carbon numbers of both monosaccharide rings involved

When the structures are drawn, the monosaccharides are identified from left to right (or top to bottom). When dealing with pyranose rings (the ring contains five carbons and one oxygen), the anomeric carbon is always carbon 1. Recall, when the ring is formed, the anomeric carbon is the site or reactivity. This means that the oxygen of the hemiacetal (the oxygen atom inside of the ring) is bonded to the anomeric carbon, C1. From there, just follow the ring and number each carbon (see below). Also remember that C6 is always outside of the ring.



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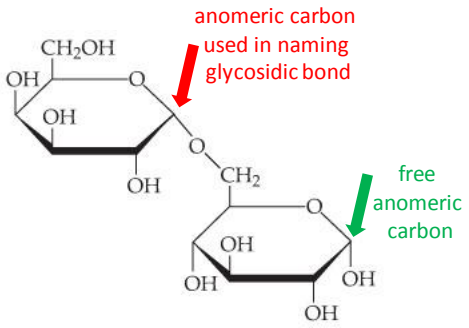
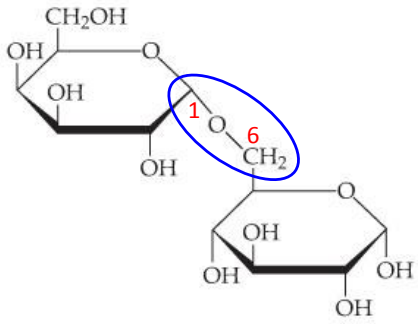
Since only one of the anomeric carbons of this disaccharide is a part of the glycosidic bond, only one alpha/beta designation will be given when naming the glycosidic bond. For that one anomeric carbon, the bond is pointing downward. This indicates that the original hydroxyl (–OH) was point down. Since this bond is down and C6 is up, they are trans to one another. When the hydroxyl (or glycosidic bond) is trans to C6, this indicates that alpha (α) designation.



Melibiose

Since the other anomeric carbon is not a part of a glycosidic bond, it is considered to be a "free" anomeric carbon. The alpha/beta designation of the free anomeric carbon is not included in the name of the glycosidic bond. Instead, it would indicate the conformation of the disaccharide (i.e. this would actually be α-melibiose because of the free anomeric carbon).

Looking at where the glycosidic bond is located (circled in the image below), we can now determine the one carbon from the left monosaccharide and the one carbon from the right monosaccharide that are involved.



Melibiose

With the conformation of the anomeric carbon and the carbon numbers all identified, the glycosidic bond can now be named with the following format: α/β designation (carbon from left or upper monosaccharide → carbon from right or lower monosaccharide). This is why the glycosidic bond for this disaccharide is α (1→6).