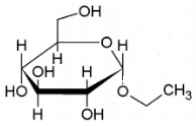
The Modification	The position of modification	The suffix, prefix	The result
Oxidation	**Anomeric carbon ➔ Last carbon ➔ Or both ➔**	**–onic –uronic –aric**	**Sugar acids (not a sugar) [Carboxyl group → COOH]**
Reduction	**Anomeric carbon (carbonyl group is reduced into hydroxyl)**	**–itol**	**Sugar alcohol (not a sugar) [Hydroxyl group → OH]**
Reduction	**Any Hydroxyl group (OH is reduced into Hydrogen)**	**Deoxy–**	**Deoxy-sugar (it still a sugar) [Hydrogen → H]**
Phosphorylation (Esterification)	**Any Hydroxyl in the molecule (adding phosphate group)**	**–phosphate**	**Sugar-phosphate**
Glycosides	**Anomeric carbon with any other molecule**	**_____**	**Glycosides**
Amination (adding amino group)	**Any OH (other than anomeric) replaced by NH_2**	**–amine**	**Amino sugar [OH → NH_2]**
Acetylation (adding acetyl)	**Acetyl added to the amino group**	**N-Acetyl–**	**_____**

- **Important Notes:**

1) Sugars rings are **Hemi-acetal or Hemi-Ketal**

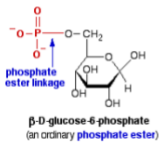
2) The bond between:

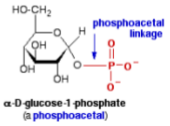
- Sugar + Phosphate → **ester linkage**
- Amino + Acetyl groups → **Amide bond**



3) If a sugar interacted with other molecule by O atom → that produces Acetal or Ketal

- Such as O-glycosides
- Phosphorylation of the anomeric carbon





- **Important Notes (carbohydrates generally):**

1) We don't have **Beta-glycosidases** which break bonds between **beta sugars**

2) We have **Alpha-glycosidases** which break bonds between **Alpha sugars**

3) We don't have **Alpha-Galactosidase** which break bonds of **alpha galactose**

4) Notes about some sugars: **هذه الأمثلة موجودة في بعض الصور وللتسهيل قمت بكتابة النقاط المطلوبة منكم لكل مثال**

- The simplest aldose → 3 carbons → Glyceraldehyde
- The simplest Ketose → 3 carbons → dihydroxyacetone
- **Erythrose** → **Aldose** with 4 carbons (**tetrose**)
- **Xylulose** → **Ketose** with 5 carbons (**pentose**)
- **Sorbose** → **Ketose** with 6 carbons (**Hexose**)
- Don't forget to memorize glucose, galactose,mannose …