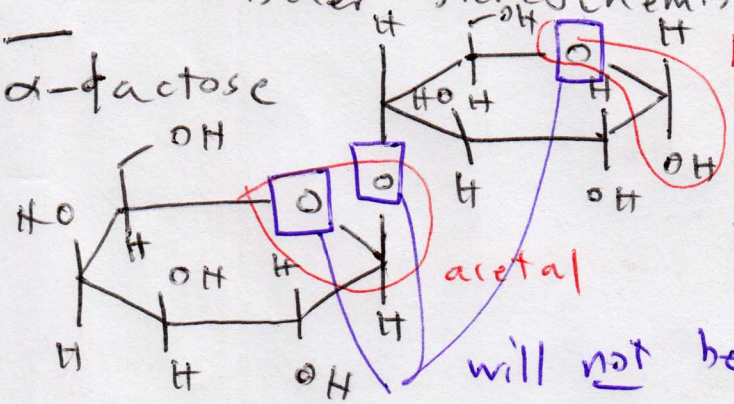
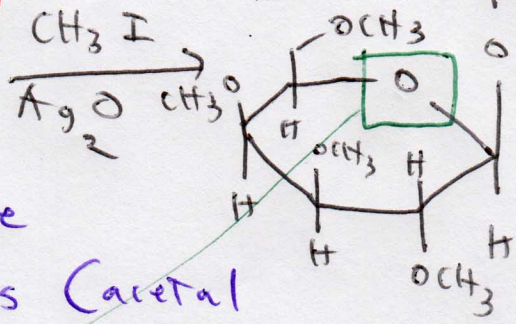
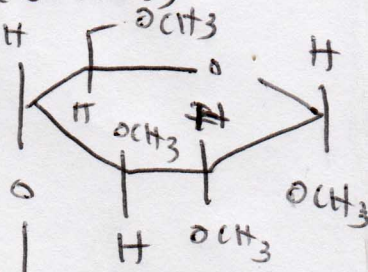
Exam 2; Carbohydrates only

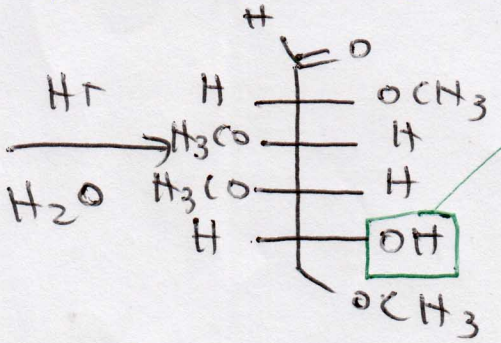
- Structure
  - Pentose vs hexose; furanose vs. pyranose; aldose vs ketose; α or β; D vs L
- Names of monosaccharides (aldo-trioses, -tetraoses, -pentoses, -hexoses); fructose
- Disaccharides: maltose, lactose, sucrose
- Interconversions
  - enolate (glucose ↔ mannose ↔ fructose)
  - mutarotation
- Derivatives - alditols, aldonic acids, aldaric acids
- Kiliani-Fischer chain extension
- Exhaustive methylation (Fischer projections)
- Tollen's test
- Fischer stereochemistry proof (osazones)



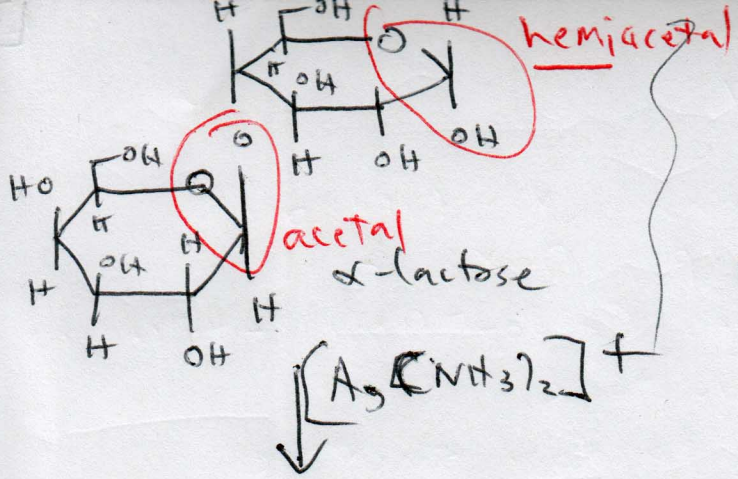




will not be alkylated since the rings (acetal + hemiacetal) are not sensitive to base

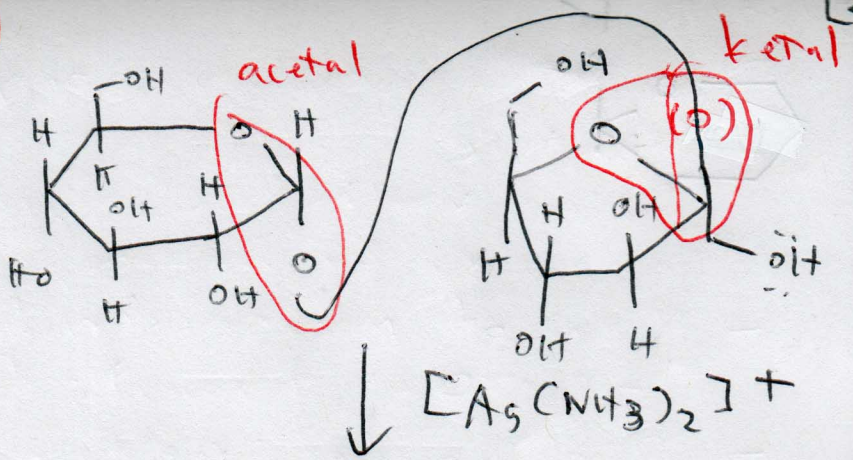


Since the indicated oxygen was part of the ring during methylation, it did not get methylated, since the ring was resistant to base conditions. Once the methylated sugar is hydrolyzed, the fact that one oxygen on the galactose fragment was not methylated, ~~the fact that~~ can be used to establish that galactose was in its pyranose form when part of lactose.



mirror

lactose is a reducing sugar

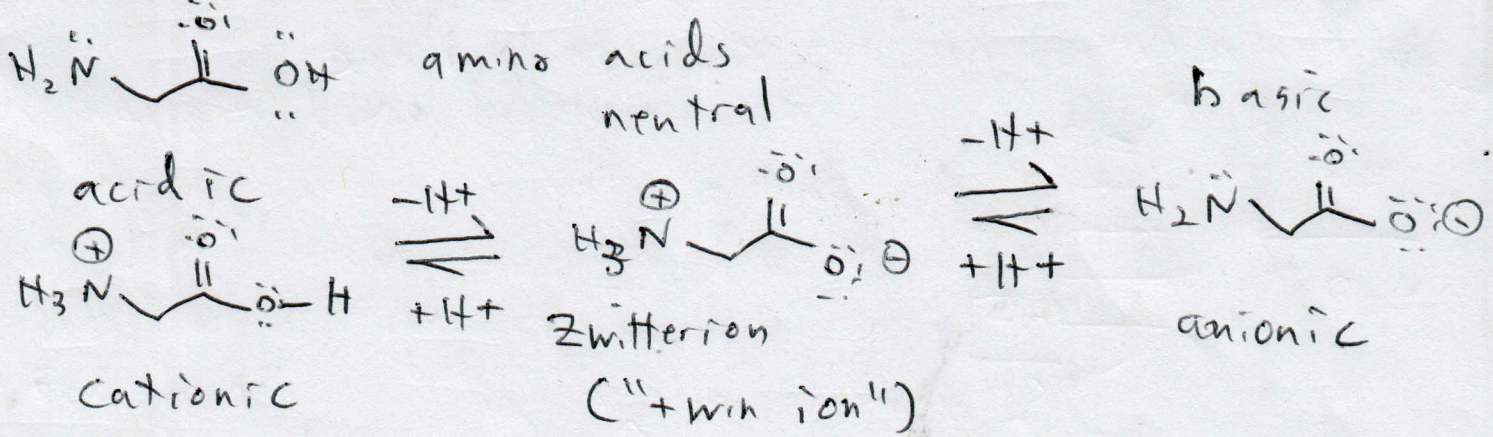


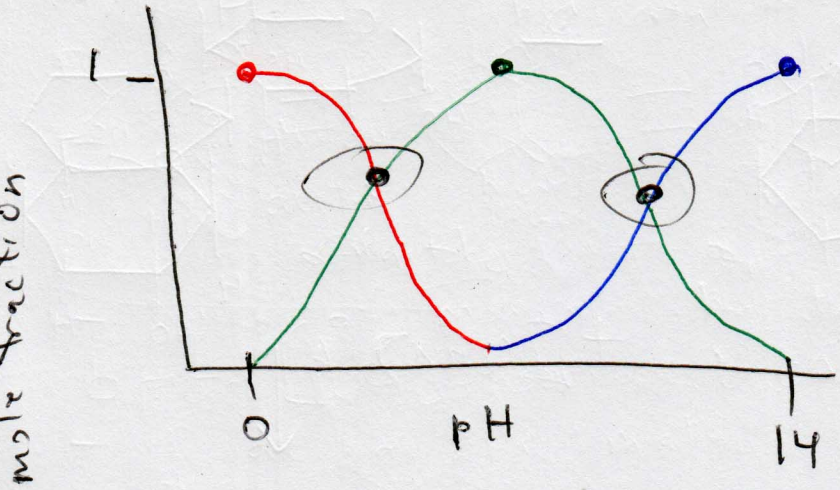
no mirror

sucrose is not a reducing sugar

Under the conditions of the Tollen's test, hemiacetals + hemiketals (of sugars) are able to exist in equilibrium with their linear aldehyde or ketone forms, which can then be oxidized (remember α-hydroxy ketals tautomerize + can then be oxidized). Ketals and acetals do not exist in equilibrium with their linear forms, so they do not get oxidized. Since lactose has a hemiacetal, it reacts with Tollens' reagent, but since sucrose only has a full acetal or ketal, it does not react.

End of exam 2





acid —

neutral —

base —