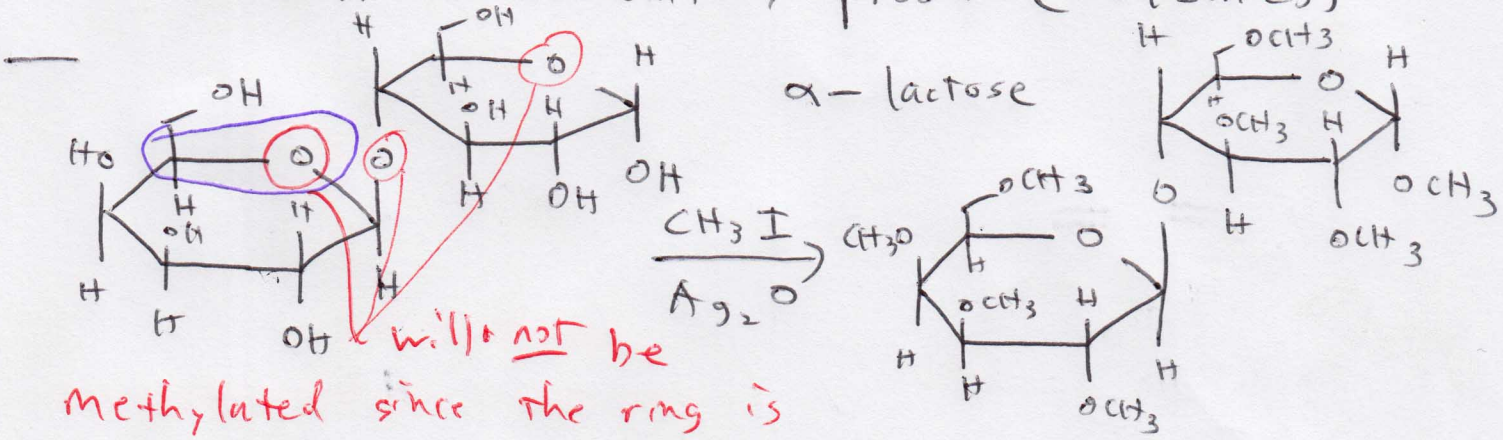
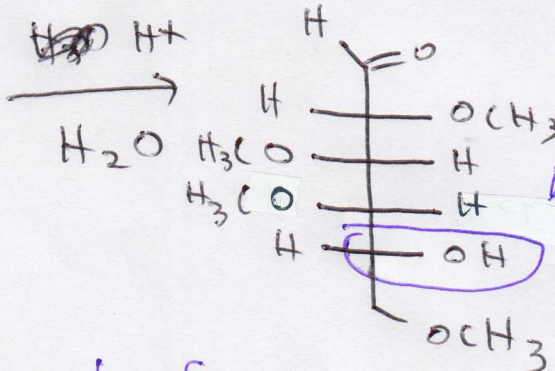
5/25/12

Exam 2: Carbohydrates only

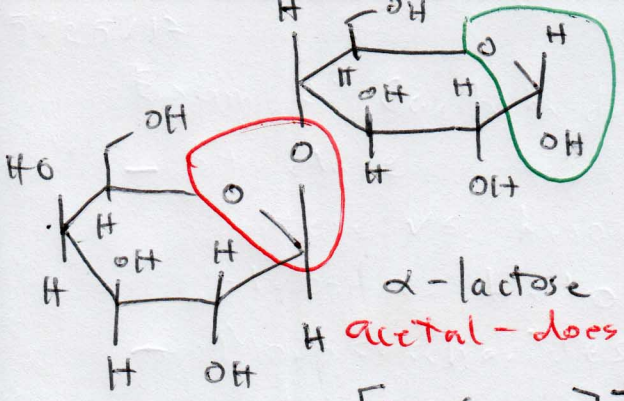
- Structure
  pentose vs. hexose; furanose vs. pyranose; aldose vs ketose; α vs β; D vs. L
- Monosaccharides (aldotrioses, aldotetraoses, aldpentoses, aldo hexoses); fructose
- Disaccharides; maltose, sucrose, lactose
- Interconversions
  enolate (glucose ↔ mannose ↔ fructose)
  mutarotation
- Kiliani-Fischer chain extension
- Exhaustive methylation
- Tollen's test
- Fischer stereochemistry proof (osazones)



will not be methylated since the ring is not sensitive to base



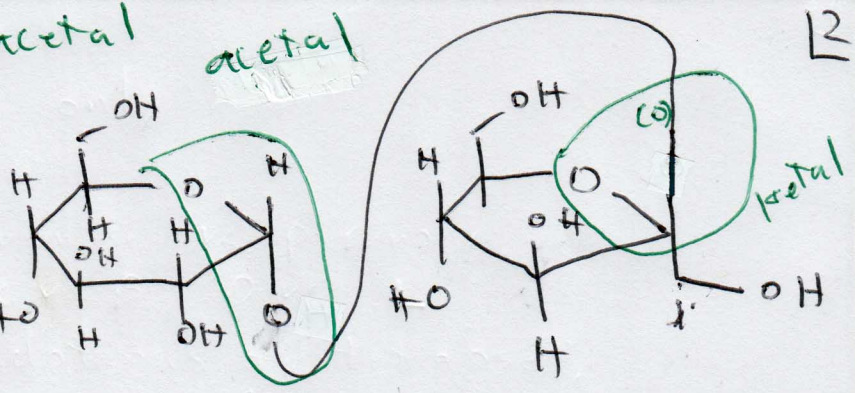
Since the indicated oxygen was part of the ring during methylation, it did not get methylated, since the ring was resistant to base conditions. Once the sugar is hydrolyzed, the fact that the oxygen was not methylated can be used to establish that galactose was in its pyranose form when part of lactose.



$\downarrow [Ag(NH_3)_2]^+$

mirror

lactose is a reducing sugar



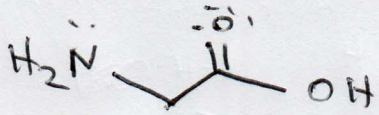
$\downarrow [Ag(NH_3)_2]^+$

no mirror

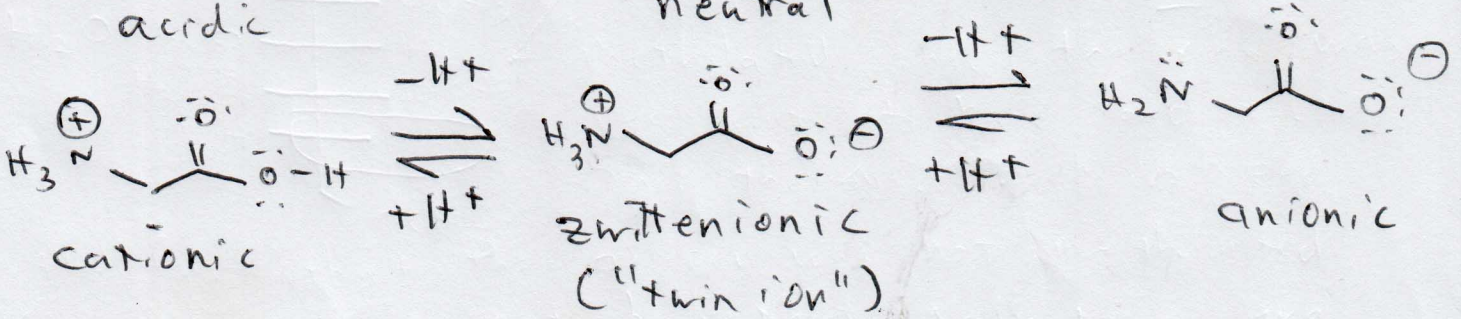
sucrose is not a reducing sugar

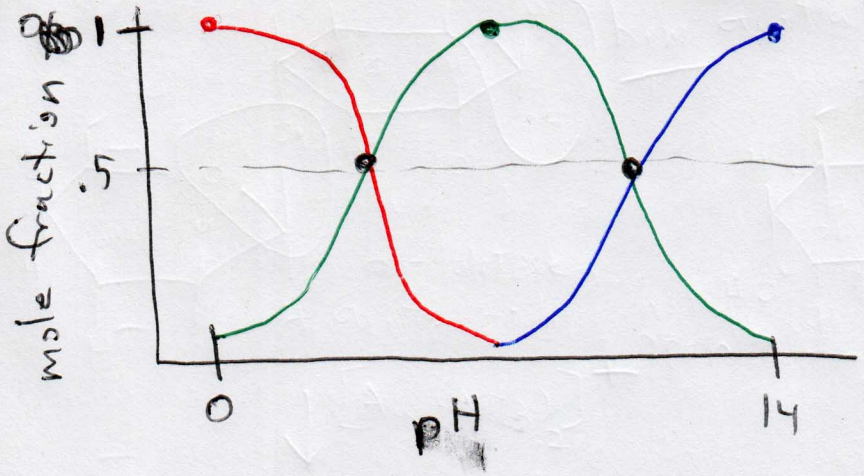
Under the conditions of the Tollen's test, hemiacetals & hemiketals are able to be in equilibrium w/ their aldehyde or ketone forms, which can then be oxidized. Ketals and acetals, however, are not in equilibrium with their carbonyl forms and therefore do not get oxidized. Since lactose has a hemiacetal, it does react w/ Tollen's reagent, but since sucrose only has a full acetal & ketal, it does not react.

End of exam 2



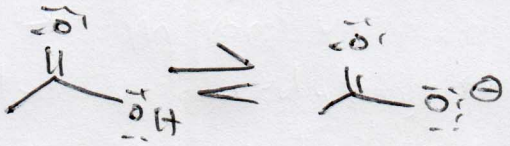
Amino acid





acid ——
neutral ——
base ——

$$K_a = \frac{[H^+][A^-]}{[HA]}$$



If a soln is prepared w/ exactly 0.500 mol of acetic acid + 0.500 M of sodium acetate, C_{total} (in volume 1.000 L H_2O), a small shift in concentrations will occur as the system attempts reach equilibrium. However, for weak acids in dilute concentration, this shift is generally minor and is therefore often ignored.