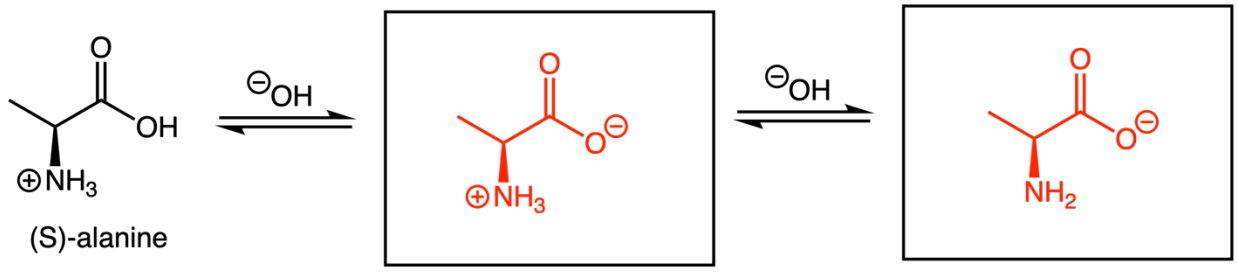
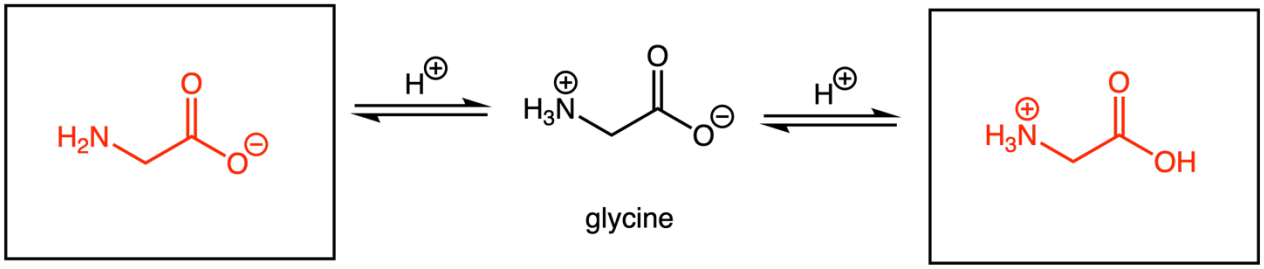
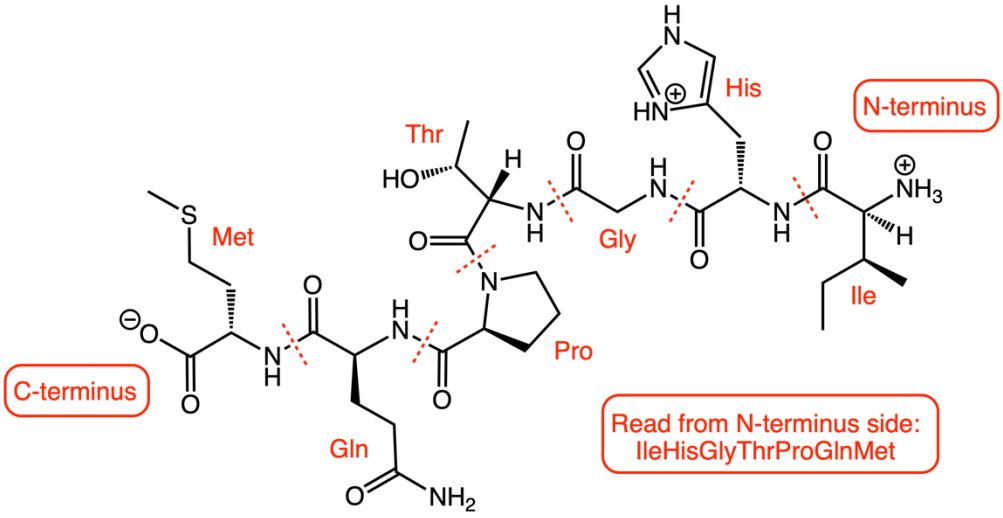
1. Complete the following schemes for (*S*)-alanine and glycine.



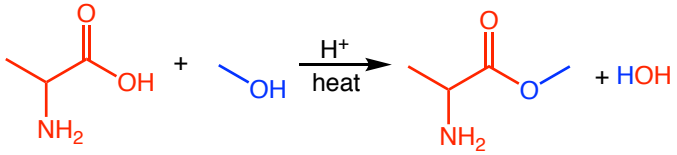


2. Identify all the amino acids that make up the following peptide. Then name the peptide using the three-letter abbreviations for the amino acids. See red dashes for where one amino acid beings/ends.

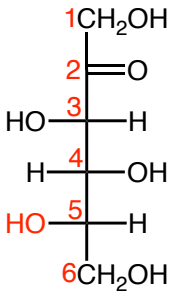


3. Identify the net charge on each of the following at pH = 6. Assign each as acidic, basic, or neutral.
   A) GlyLeuVal — Gly = (0, neutral) / Leu = (0, neutral) / Val = (0, neutral) → 0, neutral peptide
   B) LeuTrpLysGlyLys — Leu = (0, neutral) / Trp = (0, neutral) / Lys = (+, basic) → 2+, basic peptide
   C) GluLysAspAlaPheIle — Glu = (–1, acidic) / Lys = (+, basic) / Asp = (–1, acidic) / Ala = (0, neutral) / Phe = (0, neutral) / Ile = (0, neutral) → –1, acidic peptide

4. Predict the most likely product formed from heating alanine in methanol with HCl catalyst.



5. Consider L-sorbose, which is shown in the following Fischer projection.



A) Which of the following describe sorbose?

i. Hexose → 6 carbons

ii. Aldohexose

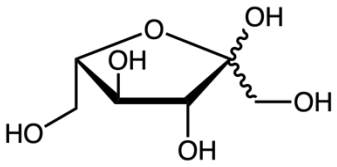
iii. Ketohexose → contains a ketone (RC=OR')

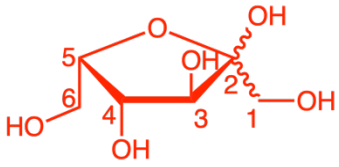
iv. Glycoside

If the -OH on carbon-5 is on the left side on the Fischer projection, this is the L form. Right is D form.

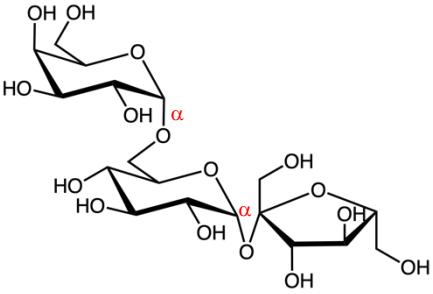
B) Which of the following is the correct Haworth projection for the cyclic form of sorbose?

Groups on the left in the Fischer projection, point up on the ring. Groups on the right point down. The ring forms between carbon-2 and the O in the last -OH at carbon-5.





6. Consider the trisaccharide raffinose.



A) Is raffinose a reducing sugar? How can you tell?

No, because there is not a free -OH at the anomeric carbon atom.

B) Assign each of the glycosidic bonds as α or β.

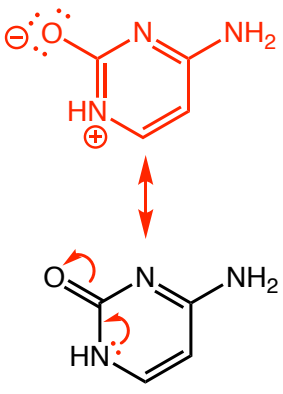
-OH points down is α and -OH points up is β.

7. The compounds cytosine, uracil, and thymine are shown below. Each exhibits aromatic character.

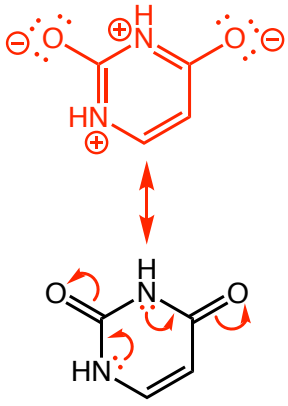
A) What are the requirements for a compound to be aromatic?

Cyclic, planar, resonance bonds, total number of π-bond and/or lone pair electrons is (4n + 2)

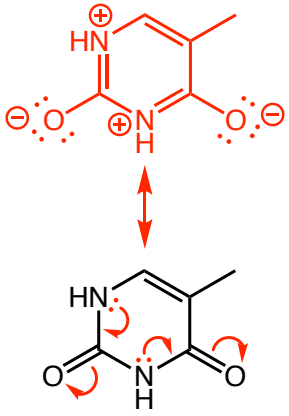
B) Explain why the following compounds might have aromatic character.



cytosine



uracil



thymine