Are you ready to begin classes again after such a nice Thanksgiving break?

A. Yes

B. No

2016-11-28 Q1

Exam 4 (Cumulative Exam)

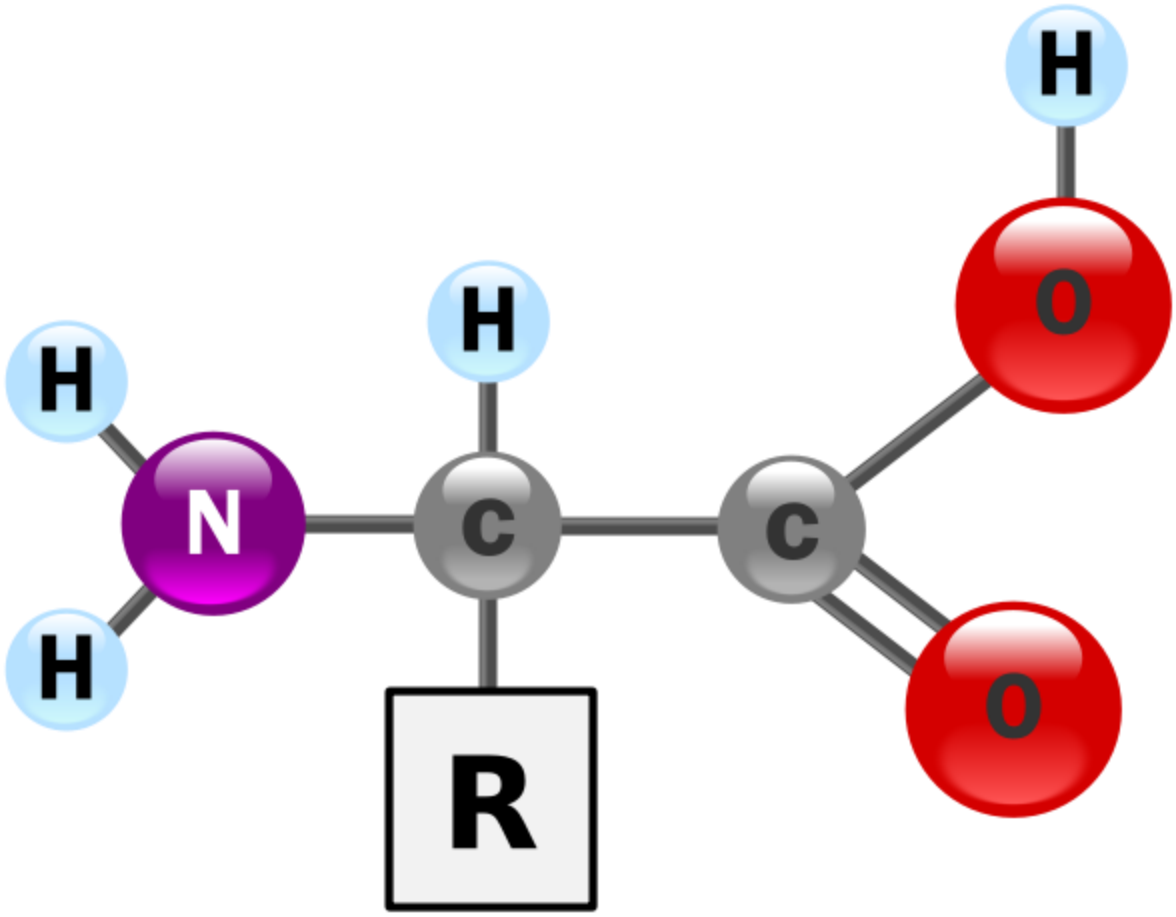
- **Time:**
  - **Thursday, December 8: 2:00 – 4:00PM OR**
  - **Saturday, December 10: 10:00 am – Noon OR**
  - **Saturday, December 10: 1:00 – 4:00PM**
- **Location – Soc/Anthro Testing Center**
  - Chapters will be covered in this order: Chapter 18, 19, 20
- **Practice Exams are Posted**
  - Ex4-90A Practice Final Exam
  - Ex4-90B Practice Final Exam
- **Deadline for alternate arrangements is Monday, 12/5/2016 at 4:30 PM (i.e., close of business)**
  - **An oral make-up exam will be required for making up the exam for all students not taking the exam on the above dates or having already made prior arrangements**

Assignment	Due Date
Ex4-01-B7-18-06B Claisen Condensation	Friday, November 11, 2016
Ex4-02-B7-18-06C Claisen Condensation	Saturday, November 12, 2016
Ex4-03-B7-18-08B A-B Unsaturated Rxns	Sunday, November 13, 2016
Ex4-04-B7-18-08C A-B Unsaturated Rxns	Monday, November 14, 2016
Ex4-05-B7-18-09A Carb Classification	Tuesday, November 15, 2016
Ex4-06-B7-19-01 Hemiacetal Formation	Wednesday, November 16, 2016
Ex4-07-B7-19-02 Carbohydrate Reactions	Thursday, November 17, 2016
Ex4-08-B7-19-02 Kiliani-Fischer Synthesis	Friday, November 18, 2016
Ex4-09-B7-19-03 Important Carbohydrates	Monday, November 28, 2016
Ex4-10-B7-19-04 Carbs in Blood Types	Monday, November 28, 2016
Thanksgiving Break	
Ex4-11-B7-20-01 Amino Acid Nomenclature	Tuesday, November 29, 2016
Ex4-12-B7-20-01B Amino Acid Naming	Wednesday, November 30, 2016
Ex4-13-B7-20-02 Amino Acid Acid Base	Thursday, December 1, 2016
Ex4-14-B7-20-03 Edmann Degradation	Friday, December 2, 2016
Ex4-15-B7-20-04 Merrified Peptide Synthesis	Saturday, December 3, 2016
Ex4-16-B7-20-05 Synthesis in Peptides	Sunday, December 4, 2016

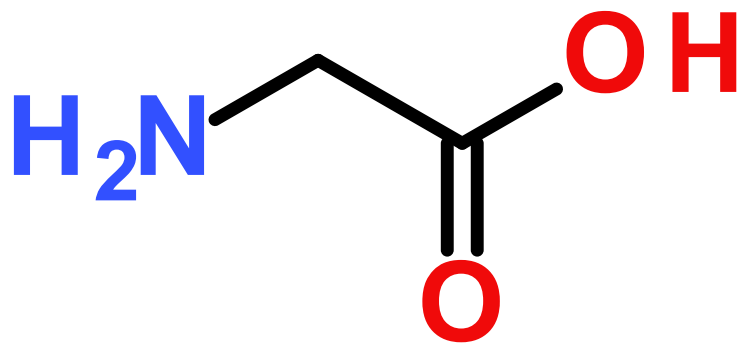
If all goes well,

- The lecture on Monday, December 5 will be a help session.
- Homework grades should be posted by Tuesday, December 6
- Class participation grades should be posted by Tuesday, December 6
- Read ahead bonus grades should be posted by Tuesday December 6

Amino Acids



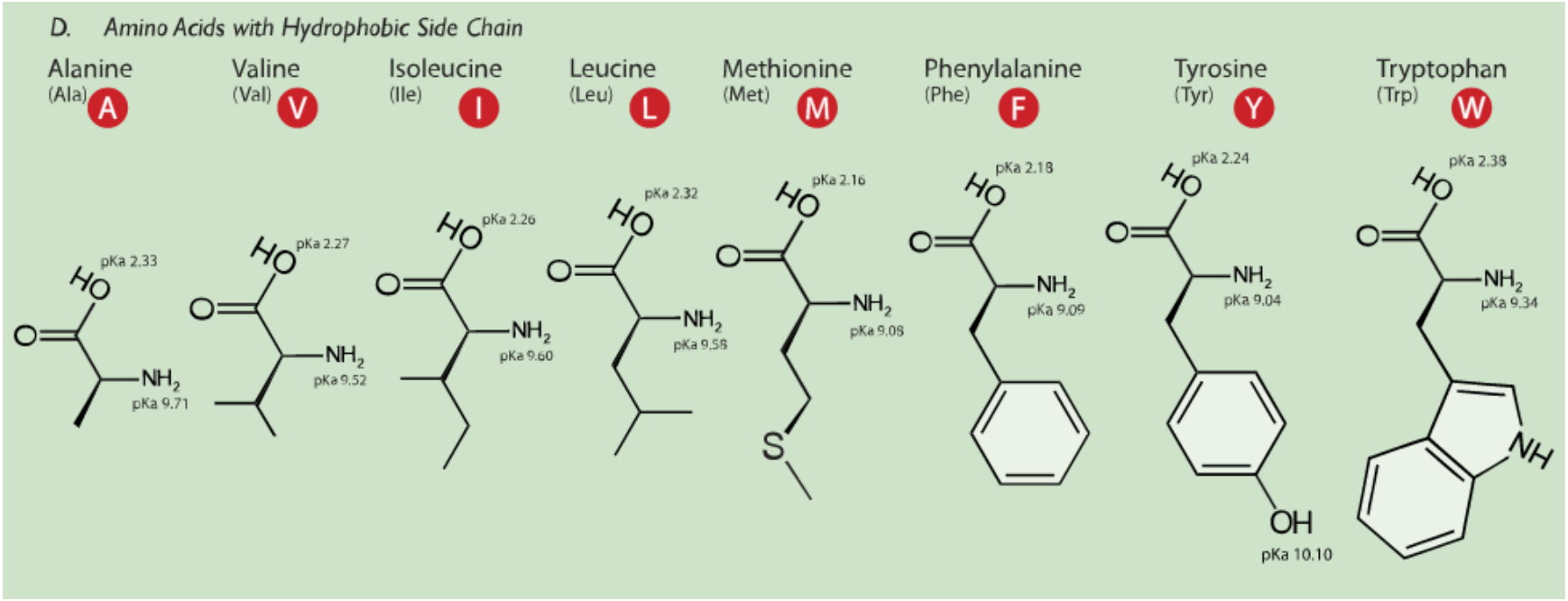
Glycine, the simplest Amino Acid



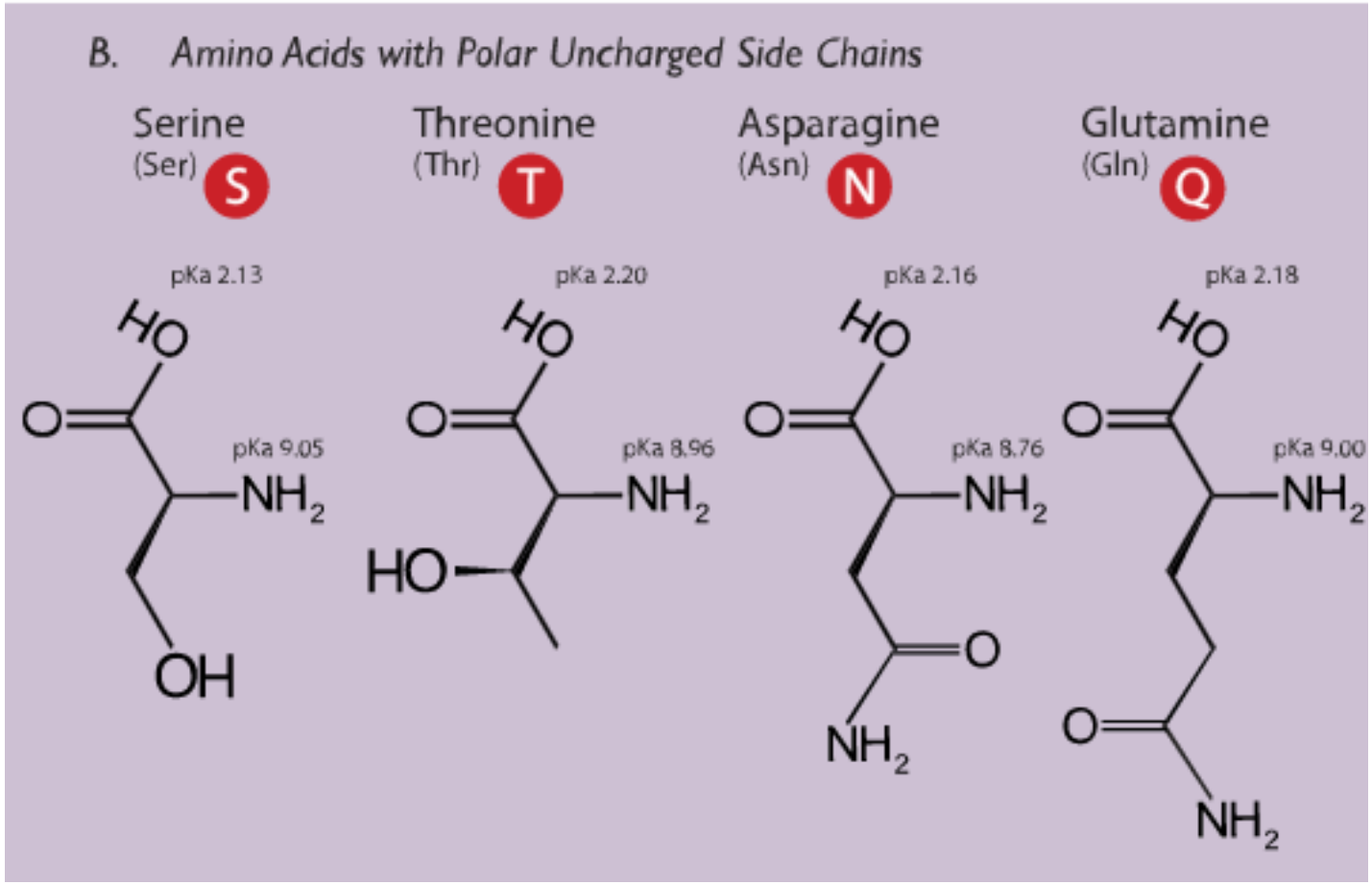
Gly

G

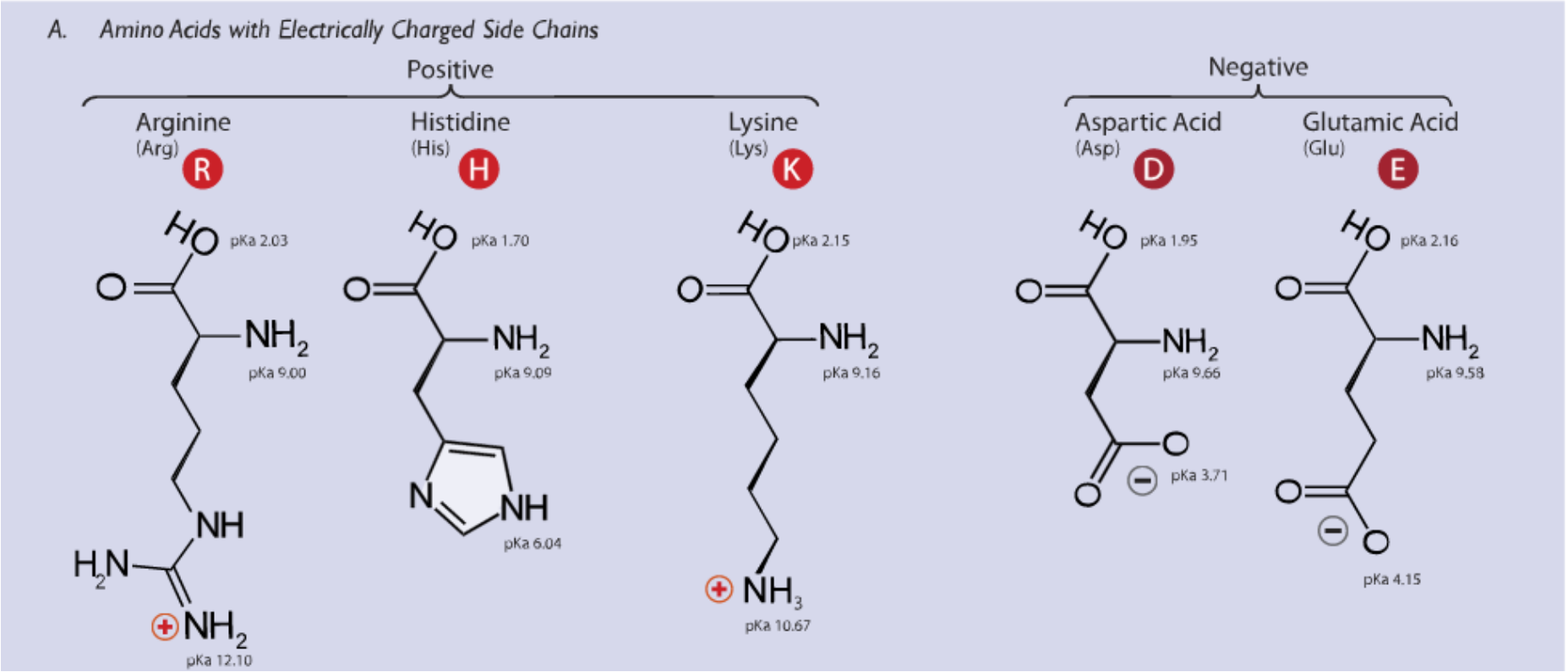
Amino Acids with Hydrophobic Side Chains



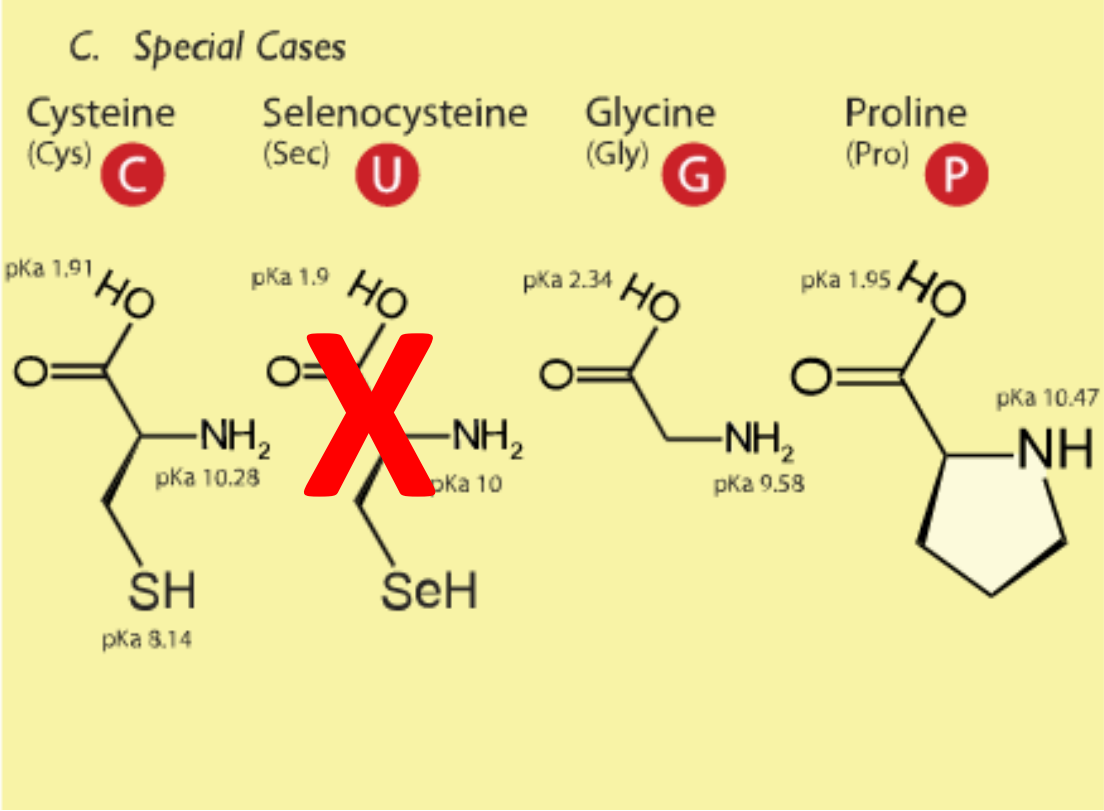
Amino Acids with Polar Uncharged Side Chains



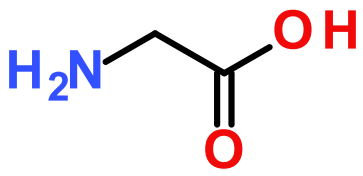
Amino Acids with Electrically Charged Side Chains

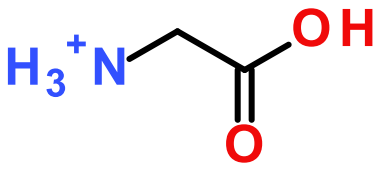
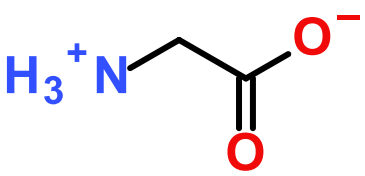
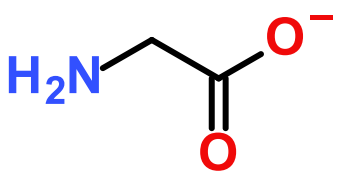


Special Case Amino Acids

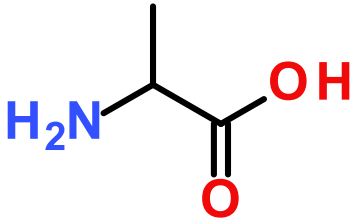


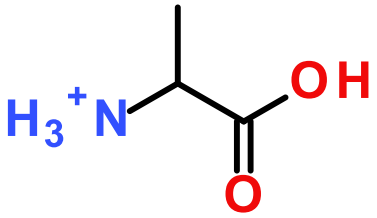
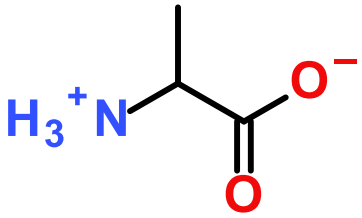
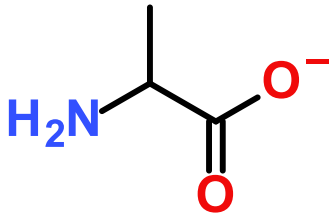
Charge on Glycine at various pH



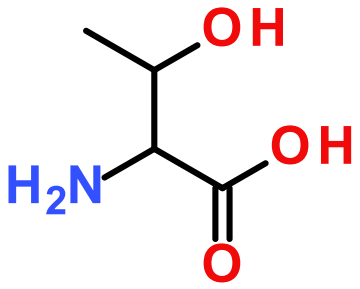
pH	1.5	7.3	11
			
Overall Charge	+1	0	-1

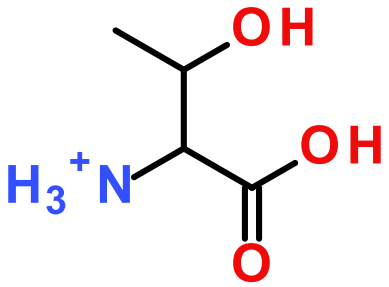
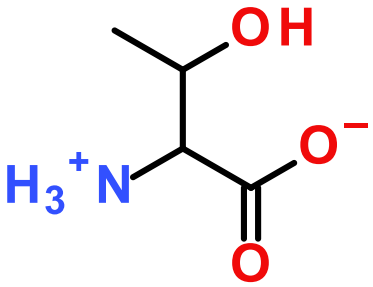
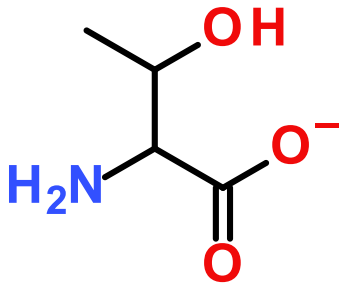
Charge on Alanine at various pH



pH	1.5	7.3	11
			
Overall Charge	+1	0	-1

Charge on Threonine at various pH

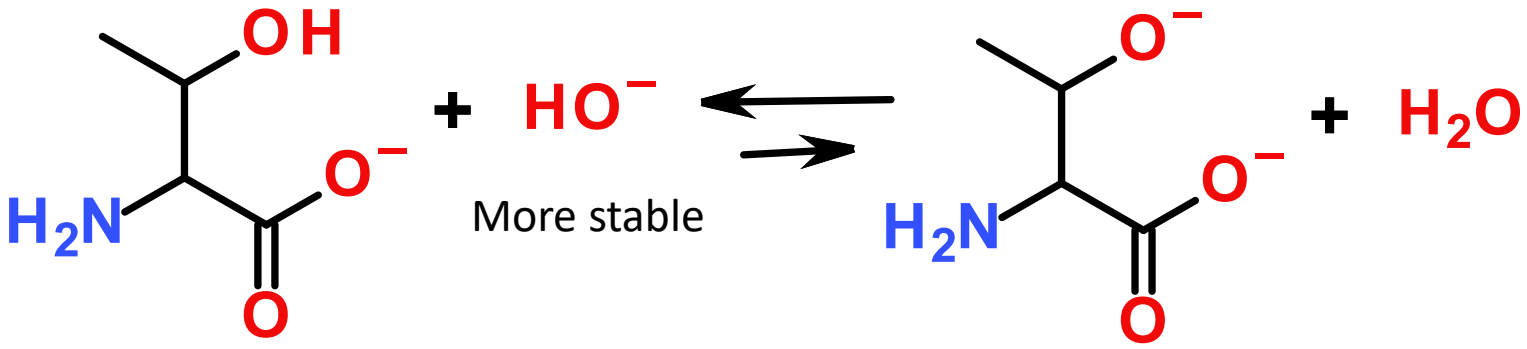


pH	1.5	7.3	11
			
Overall Charge	+1	0	-1

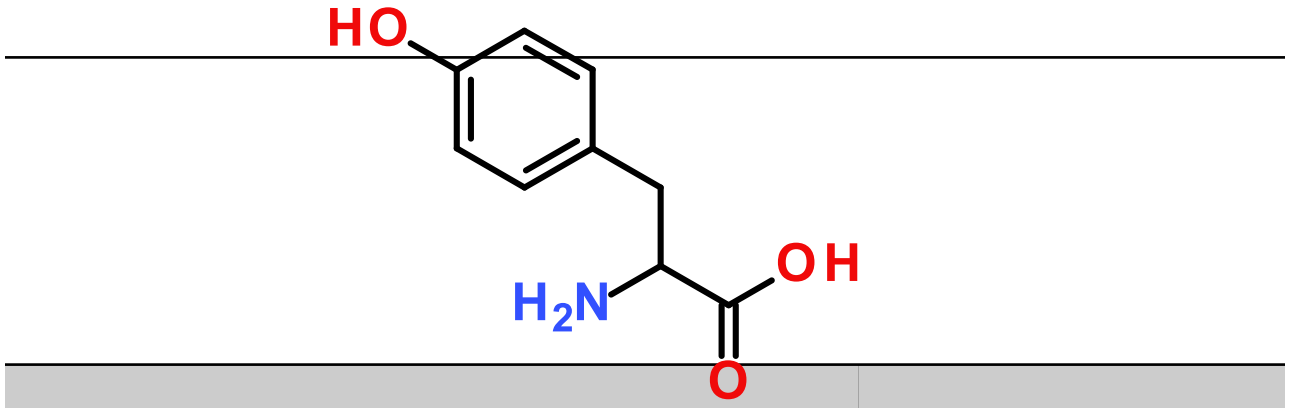
Why Does Thr Not Deprotonate?

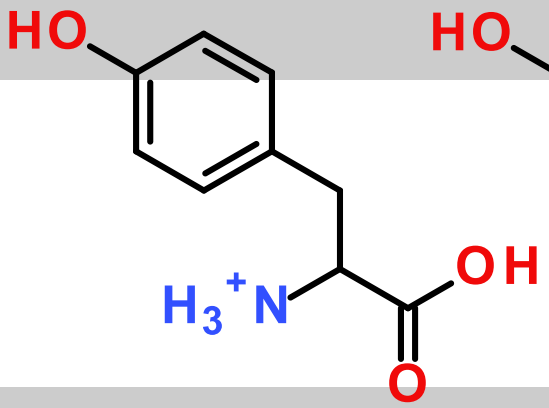
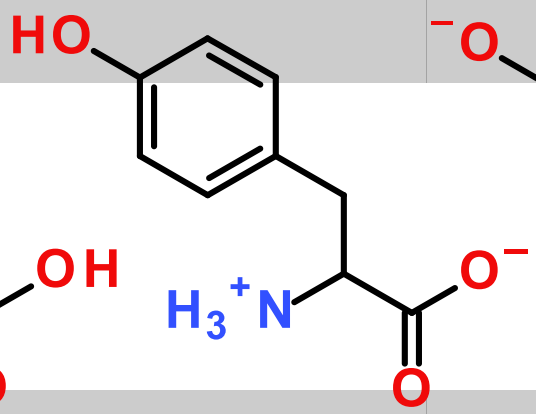
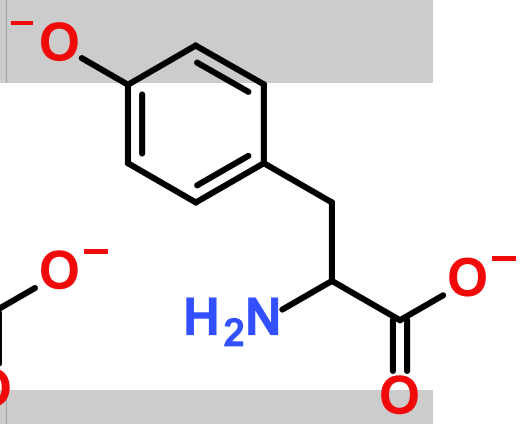
$pK_a = 15.9$ More stable

Less stable $pK_a = 13.995$

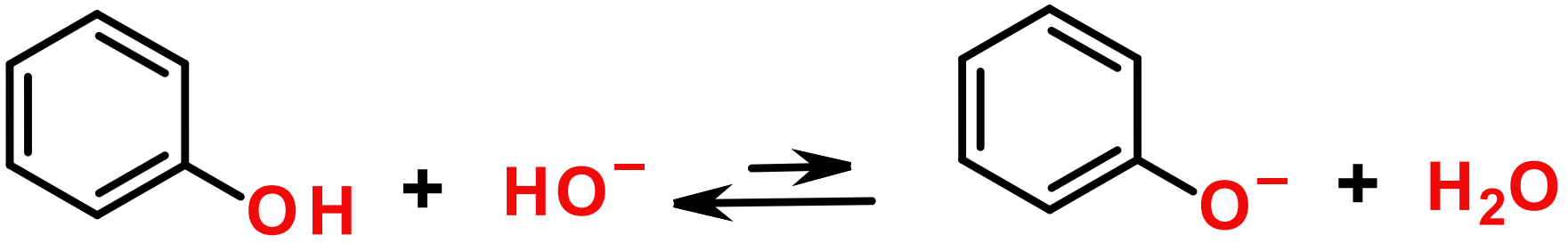


Charge on Tyrosine at various pH

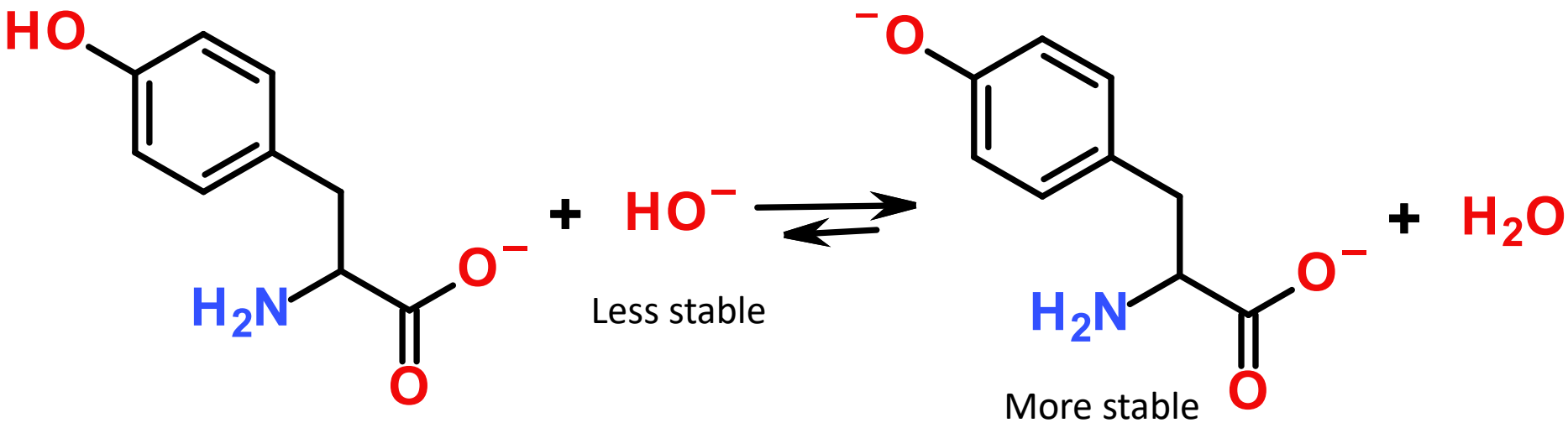


pH	1.5	7.3	11
			
Overall Charge	+1	0	-2

Why Does Tyr Deprotonate?

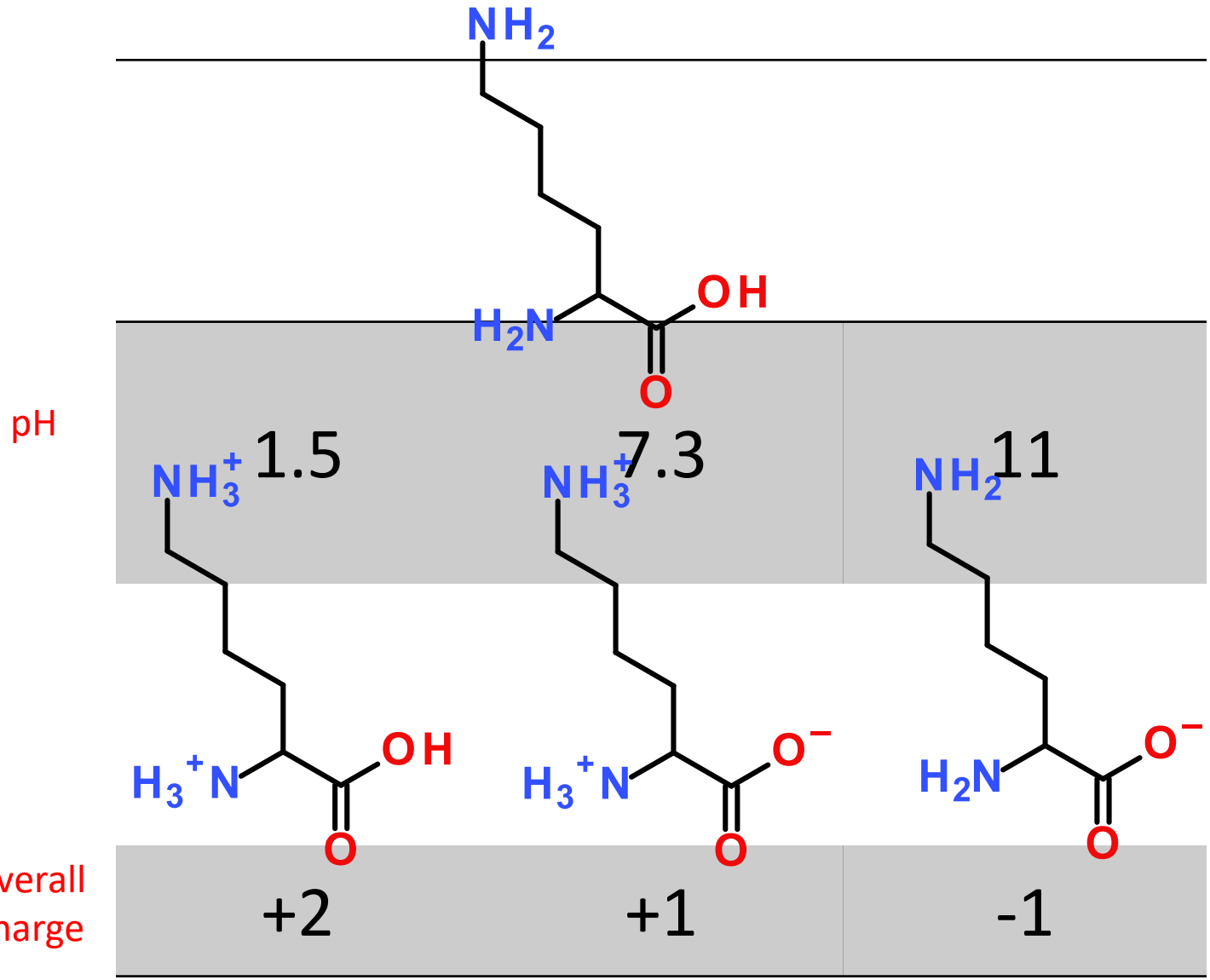


$pK_a = 9.95$ Less stable More stable $pK_a = 13.995$

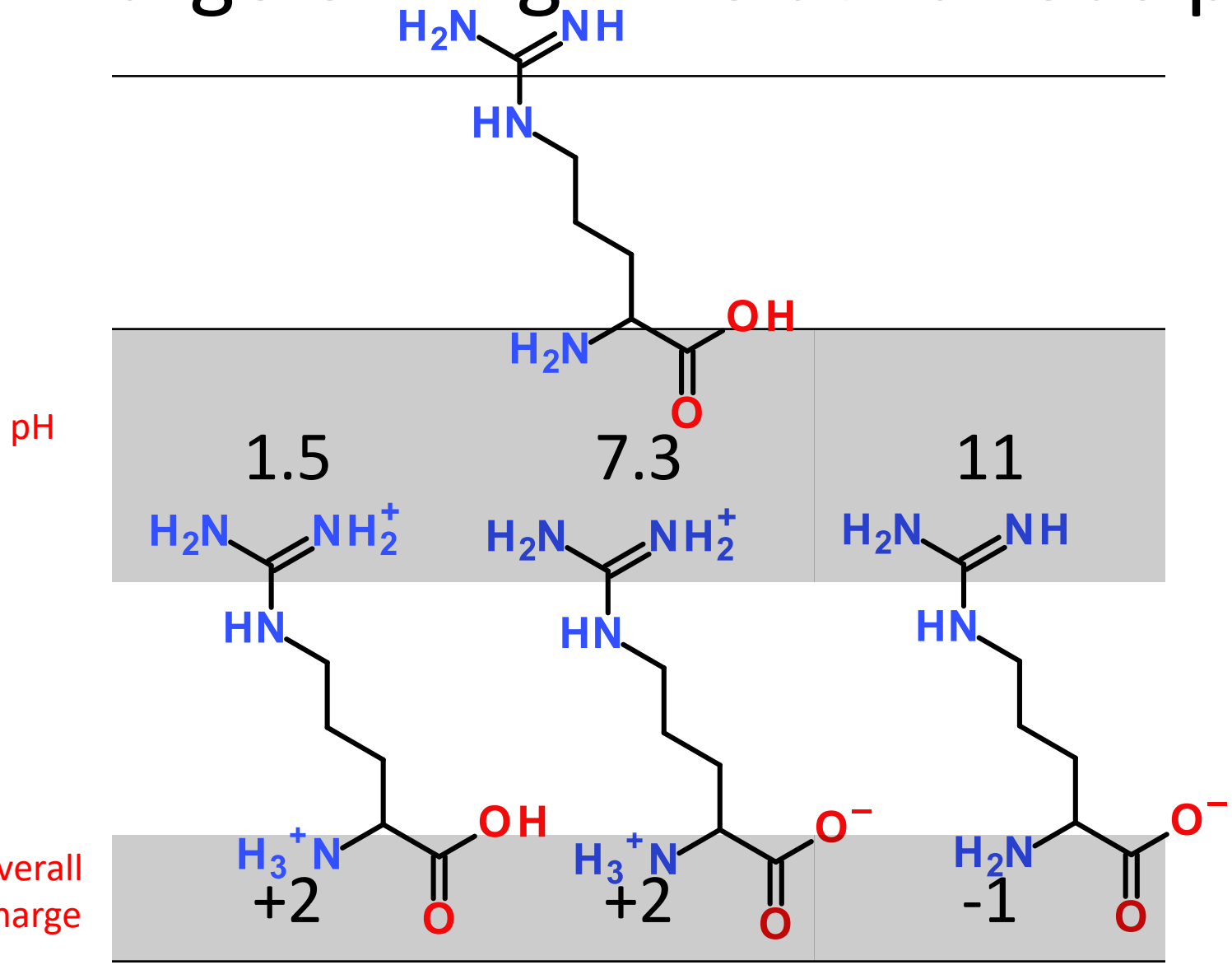


Resonance is the key to the enhanced stabilization

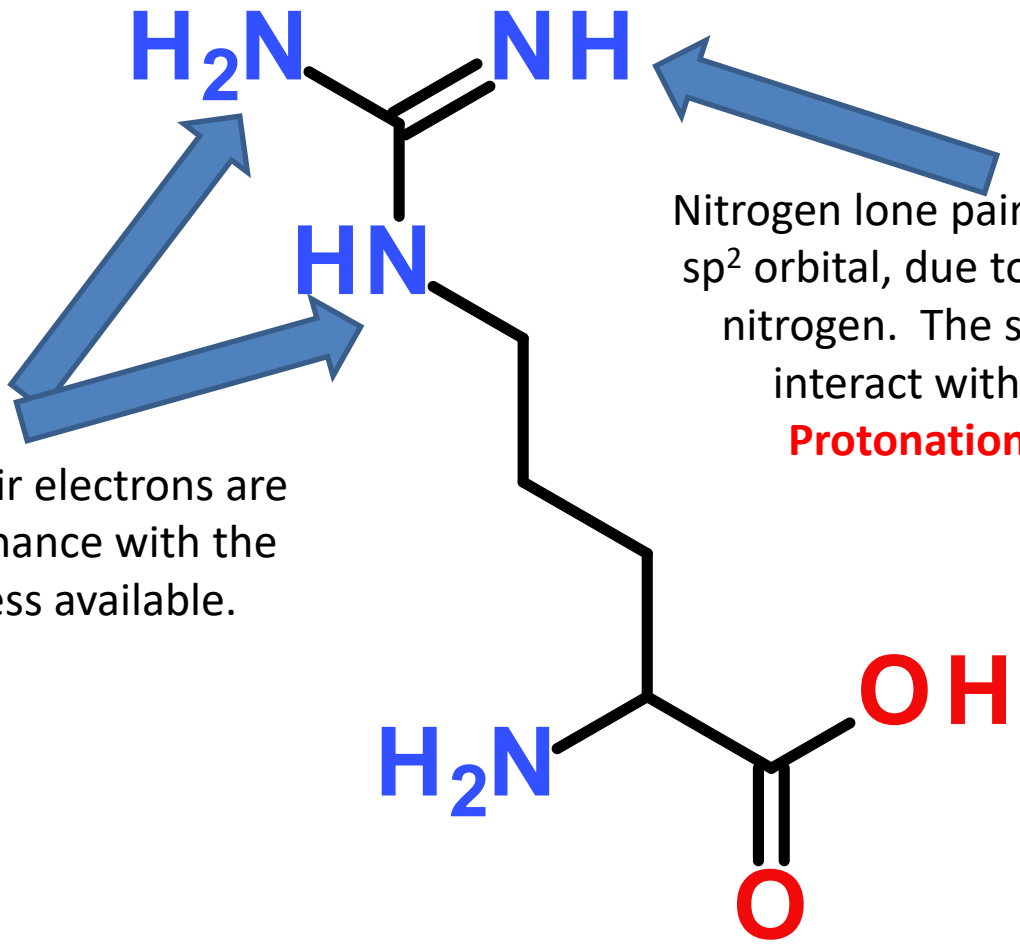
Charge on Lysine at various pH



Charge on Arginine at various pH



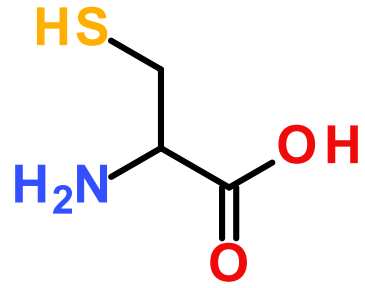
Which nitrogens are subject to protonation?

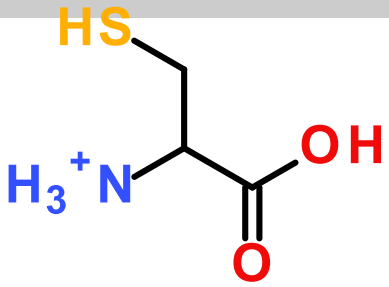
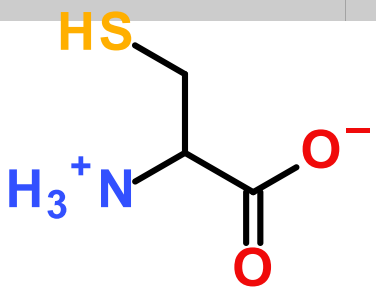
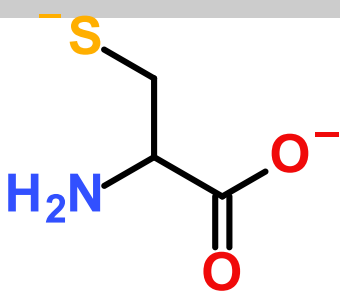


Nitrogen lone pair electrons are in an sp^2 orbital, due to the π-bond of the nitrogen. The sp^2 orbital cannot interact with the π-system. **Protonation occurs here**!

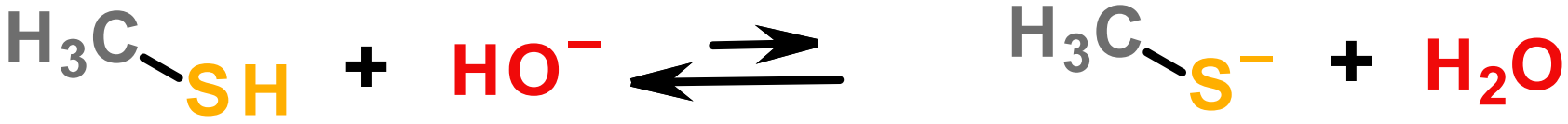
Nitrogen lone pair electrons are involved in resonance with the C=N and are less available.

Charge on Cysteine at various pH

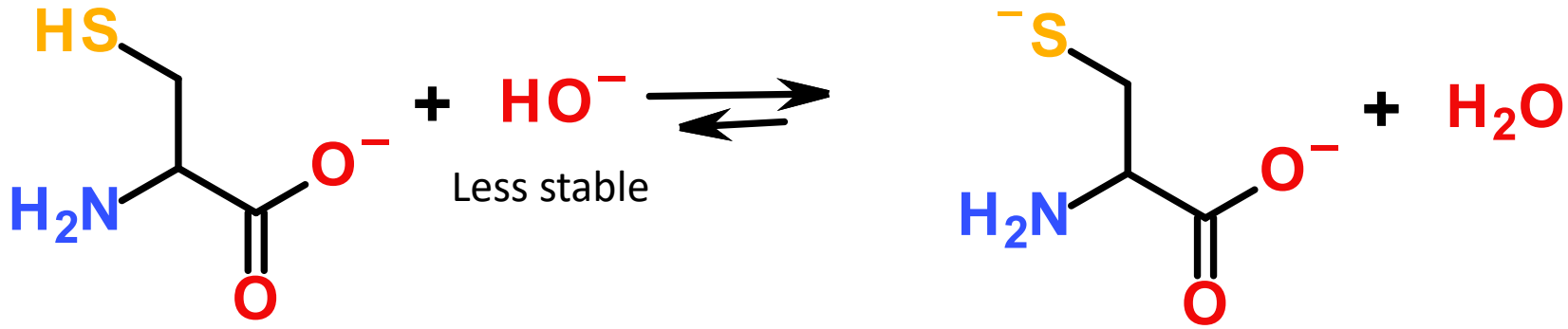


pH	1.5	7.3	11
			
Overall Charge	+1	0	-2

Why Does CyS Deprotonate?



$pK_a = 10.4$ Less stable More stable $pK_a = 13.995$



Lower in the column on the periodic table is the key to the enhanced stabilization