

LeAP: Acid Base

- Due Sep 5, 2024 at 11:59pm
- Points 5
- Questions 8
- Available until Sep 9, 2024 at 11:59pm
- Time Limit None
- Allowed Attempts 2

Instructions

Lecture Application Practices (LeAPs) serve as initial opportunities for students to apply the information they've gathered from the pre-lecture videos and in-person lectures/lecture videos.

Students are strongly encouraged to complete LeAPs on the same day that the corresponding topic is completed in class. However, to provide consistent due dates, sets of LeAPs will be due on Thursdays at 11:59 PM - Chicago time. See the Weekly Schedules or Course Calendar for specific due dates for each activity.

Each LeAP is worth 5 points. Credit will be awarded based on accuracy. There is no time limit. Students will receive two attempts for each assignment and the highest score will be recorded in the gradebook. LeAPs may consist of multiple-choice, calculation, ranking, choose all that apply, and fill in the blank type questions.

This quiz was locked Sep 9, 2024 at 11:59pm.

Attempt History

	Attempt	Time	Score
KEPT	Attempt 2	8 minutes	5 out of 5
LATEST	Attempt 2	8 minutes	5 out of 5
	Attempt 1	8,177 minutes	3 out of 5

⚠ Correct answers are hidden.

Score for this attempt: 5 out of 5

Submitted Sep 4, 2024 at 1:39pm

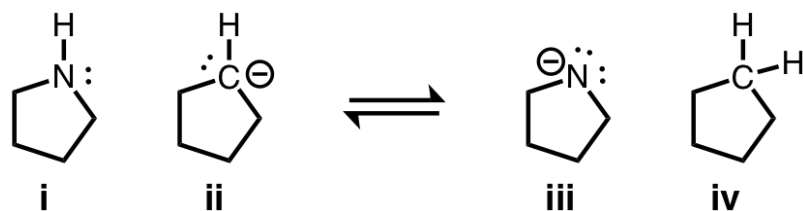
This attempt took 8 minutes.



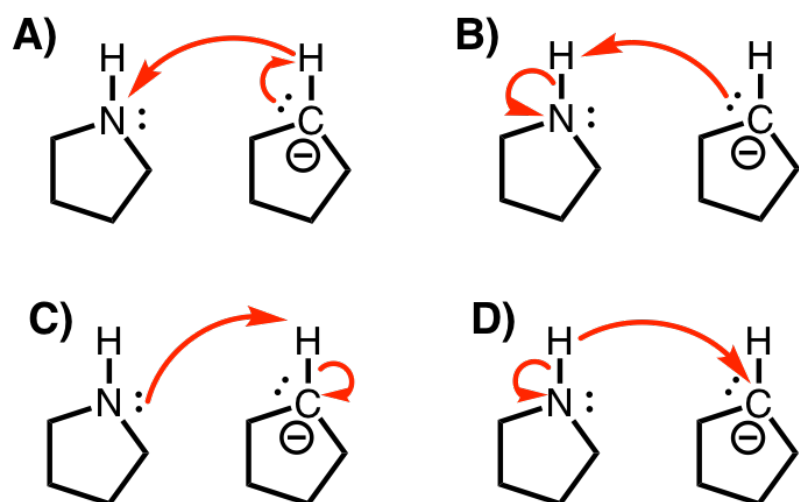
Question 1

0.5 / 0.5 pts

Use the acid-base reaction shown below to answer questions 1-2.



Which arrow-pushing mechanism correctly describes the moment of electrons during this acid-base reaction?



☐ A

☒ B

☐ C

☐ D



Question 2

0.5 / 0.5 pts

Which side of the reaction is favored by equilibrium? (Hint: Remember that the stronger acid wants to give up its proton, in other words equilibrium will shift away from the stronger acid. Another way to think about it would be that equilibrium wants to shift toward the more stable, lower energy conjugate base.)

☐ The left side of the reaction (starting materials) is favored.

☒ The right side of the reaction (products) is favored

☐ Neither side is favored. The acids are equally acidic.

☐ The answer cannot be determined.



Question 3

0.5 / 0.5 pts

Which of the following factors DOES NOT affect the strength of the inductive effect?

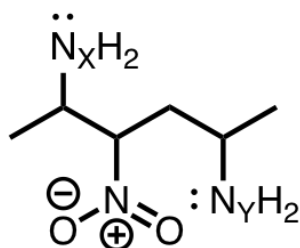
- ☐ The distance between the acidic proton and the electronegative group.
- ☐ The number of electronegative groups.
- ☐ How electronegative the electronegative group is.
- ☒ How many electrons the electronegative group has.



Question 4

1 / 1 pts

The nitro group (-NO₂) is an electron-withdrawing group and can affect reactivity through resonance or the inductive effect. Use the structure shown below to answer questions 4-6.



Which type of electron delocalization affects the acidity of the two amine (-NH₂) groups, resonance or the inductive effect? How do you know?

- ☐ Inductive Effect. The electronegative atoms in the NO₂ group are able to pull electron density toward it through a conjugated system of p orbitals.
- ☐ Resonance. The electronegative atoms in the NO₂ group are able to pull electron density toward it through a conjugated system of p orbitals.
- ☒ Inductive Effect. The electronegative atoms in the NO₂ group are able to pull electron density toward it through the sigma bonds.
- ☐ Resonance. The electronegative atoms in the NO₂ group are able to pull electron density toward it through the sigma bonds.



Question 5

0.5 / 0.5 pts

Which NH₂ group is **most acidic** and why?

- ☐ N_YH₂ is more acidic because it is pointing toward one of the oxygen atoms in the NO₂ group.
- ☐ N_XH₂ is more acidic because it is pointing away from the oxygen atoms in the NO₂ group.
- ☒ N_XH₂ is more acidic because it has fewer sigma bonds between it and the NO₂ group.

- ☒ $\text{N}_\text{Y}\text{H}_2$ is more acidic because it has more sigma bonds between it and the NO_2 group.



Question 6

0.5 / 0.5 pts

Consider the lone pairs on the two amine nitrogen atoms. Which lone pair is **most basic** and why?

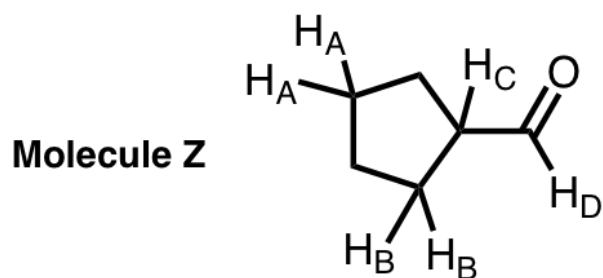
- ☒ The N_Y lone pair is more basic because it is **less** stabilized by electron delocalization.
- ☐ The N_Y lone pair is more basic because it is **more** stabilized by electron delocalization.
- ☐ The N_X lone pair is more basic because it is **less** stabilized by electron delocalization.
- ☐ The N_X lone pair is more basic because it is **more** stabilized by electron delocalization.



Question 7

1 / 1 pts

Use the structure of Molecule Z shown below to answer questions 7-8.



Which position in Molecule Z has the **lowest** pK_a ?

- ☐ H_A
- ☐ H_B
- ☒ H_C
- ☐ H_D



Question 8

0.5 / 0.5 pts

Which of the following choices can be used to explain your answer to the previous question?

- ☐ The position with the lowest pK_a has a conjugate base that is stabilized by the atom effect.
- ☒ The position with the lowest pK_a has a conjugate base that is stabilized by resonance/conjugation.
- ☐ The position with the lowest pK_a has a conjugate base that is stabilized by the inductive effect.

- ☐ The position with the lowest pKa has a conjugate base that is stabilized by the orbital effect.

Quiz Score: 5 out of 5