

Acid base reaction:

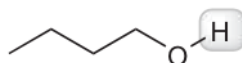
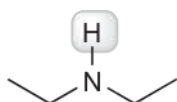


Factors affecting acidity: (in order of importance)

1. What atom is the charge on? (Remember the difference between comparing atoms in the same row and comparing atoms in the same column.)
2. Are there any resonance effects making one conjugate base more stable than the others?
3. Are there any inductive effects (electronegative atoms or alkyl groups) that stabilize or destabilize any of the conjugate bases?
4. In what orbital do we find the negative charge for each conjugate base that we are comparing?

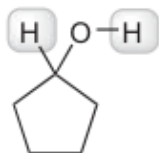
Exception: $\text{H}-\text{C}\equiv\text{C}-\text{H}$ is more acidic than NH_3
 \therefore rule 4 is more important than rule 1 here

EXERCISE 3.1 Compare the two protons highlighted below and determine which one is more acidic.



PROBLEMS

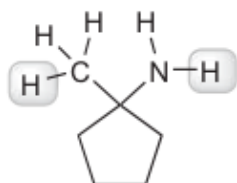
3.2 Compare the two highlighted protons in the following compound and determine which is more acidic. Remember to begin by drawing the two conjugate bases, and then compare them.



Conjugate base 1

Conjugate base 2

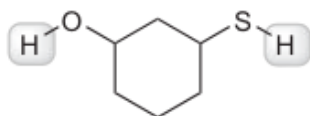
3.3 Compare the two highlighted protons in the following compound and determine which is more acidic.



Conjugate base 1

Conjugate base 2

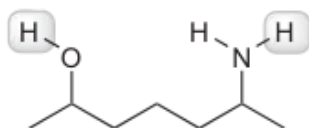
3.4 Compare the two highlighted protons in the following compound and determine which is more acidic.



Conjugate base 1

Conjugate base 2

3.5 Compare the two highlighted protons in the following compound and determine which is more acidic.

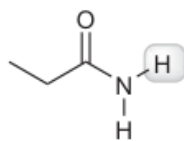
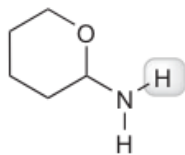


Conjugate base 1

Conjugate base 2

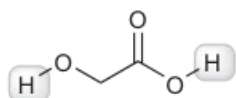
Factor 2: Resonance

EXERCISE 3.6 Compare the two protons highlighted below and determine which one is more acidic.



PROBLEMS

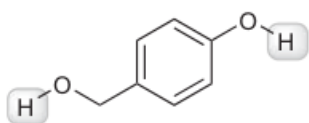
3.7 Compare the two highlighted protons and determine which one is more acidic.



 Conjugate base 1

 Conjugate base 2

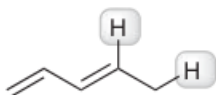
3.8 Compare the two highlighted protons and determine which one is more acidic.



 Conjugate base 1

 Conjugate base 2

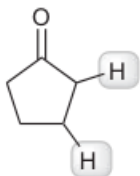
3.9 Compare the two highlighted protons and determine which one is more acidic.



 Conjugate base 1

 Conjugate base 2

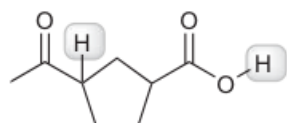
3.10 Compare the two highlighted protons and determine which one is more acidic.



 Conjugate base 1

 Conjugate base 2

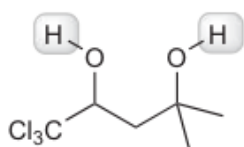
3.11 Compare the two highlighted protons and determine which one is more acidic.



 Conjugate base 1

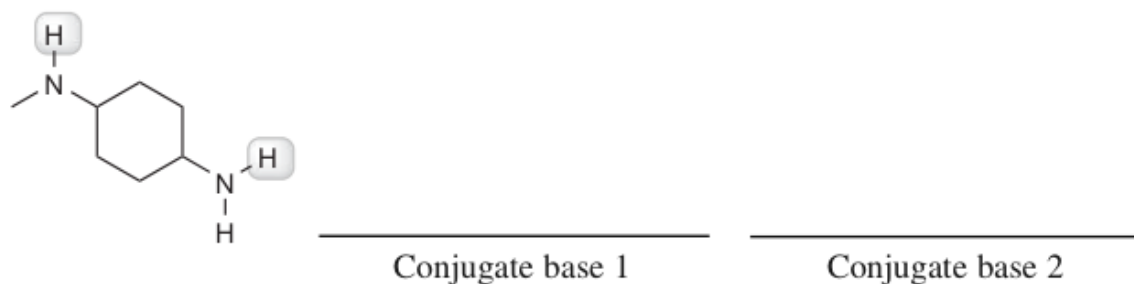
 Conjugate base 2

EXERCISE 3.13 Compare the two protons highlighted below and determine which one is more acidic.

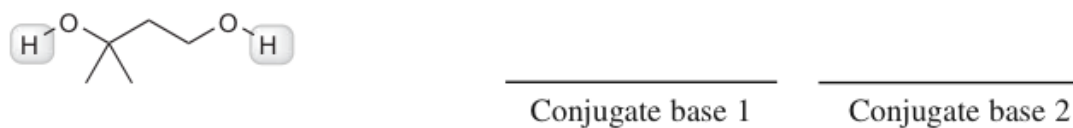


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3.14 Compare the two highlighted protons and determine which one is more acidic.



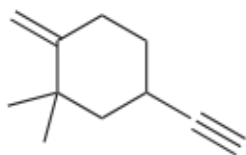
3.15 Compare the two highlighted protons and determine which one is more acidic.



3.16 Compare the two highlighted protons and determine which one is more acidic.

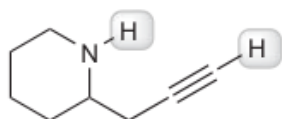


EXERCISE 3.17 Locate the most acidic proton in the following compound:

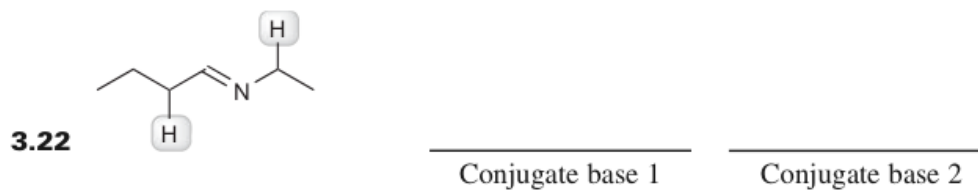
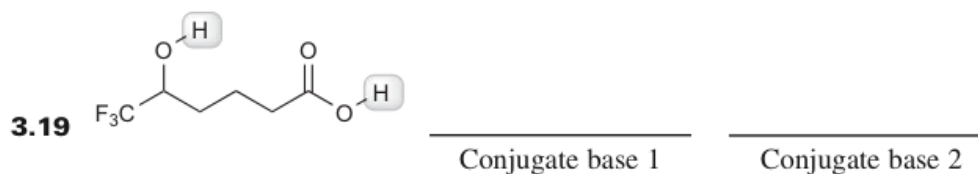


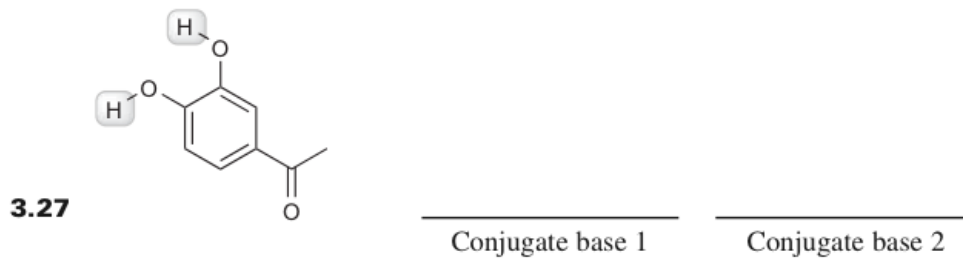
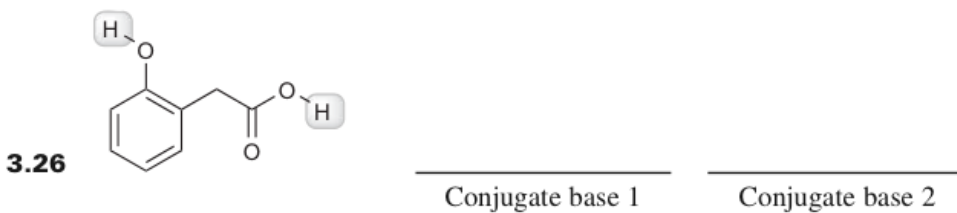
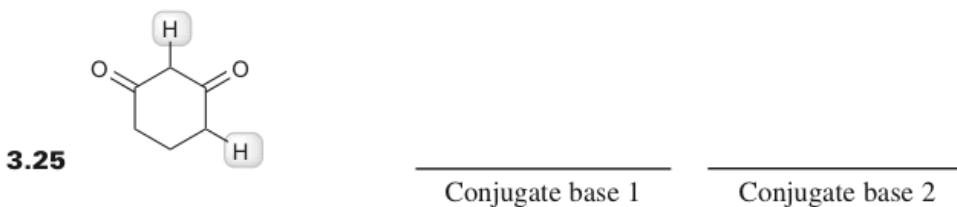
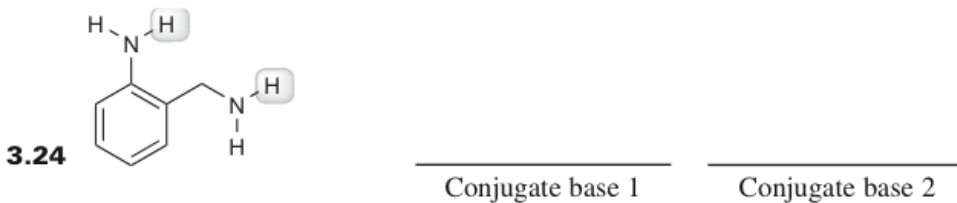
EXERCISE 3.18 Compare the two protons highlighted below and determine which one is more acidic.

(EXCEPTION)

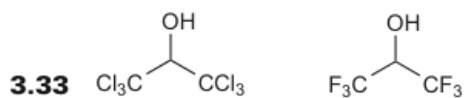
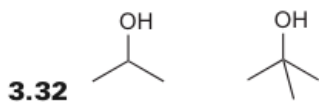
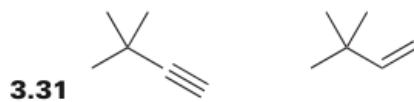
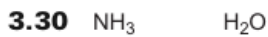


PROBLEMS For each of the following compounds, two protons have been highlighted. In each case, determine which of the two protons is more acidic.





PROBLEMS For each pair of compounds below, predict which will be more acidic.



Predicting position of equilibrium:

EXERCISE 3.34 Predict the position of equilibrium for the following reaction:



PROBLEMS

3.35 Predict the position of equilibrium for the following reaction:



3.36 Predict the position of equilibrium for the following reaction:



3.37 Predict the position of equilibrium for the following reaction:



Showing a mechanism:

EXERCISE 3.38 Show the mechanism for the following acid–base reaction:



PROBLEMS

3.39 Show the mechanism for the following acid–base reaction:

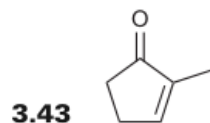
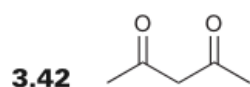


3.40 Show the mechanism for the following acid–base reaction:



PROBLEMS Show the mechanism for the reaction that takes place when you mix hydroxide (HO^-) with each of the following compounds (remember that you need to look for the most acidic proton in each case).

3.41 CH_3SH



PROBLEMS Show the mechanism for the reaction that takes place when you mix the amide ion (H_2N^-) with each of the following compounds (remember that you need to look for the most acidic proton in each case).

