Organic Chemistry Prep Workshop – Day 4
You Try Solutions

You Try 4-1

Write the conjugate base for each of the following

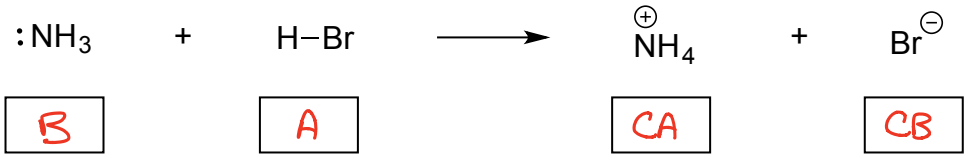
$H_2PO_4^-$ HPO_4^{2-}	$CH_3OH_2^+$ CH_3OH	CH_3CH_2OH $CH_3CH_2O^-$

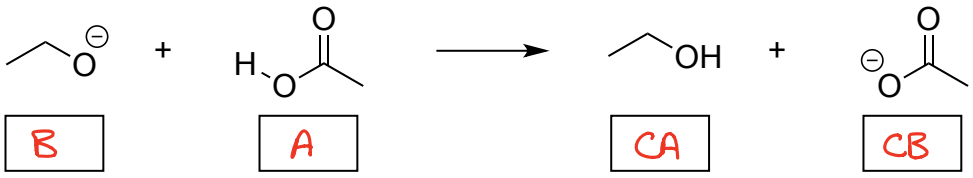
Write the conjugate acid for each of the following

H_2S H_3S^+	CH_3O^- CH_3OH	$H_2PO_4^-$ H_3PO_4

You Try 4-2

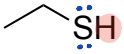
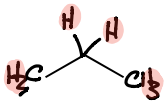
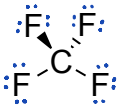
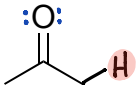
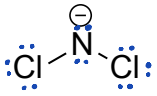
For each reaction below, label the acid, base, conjugate acid, and conjugate base





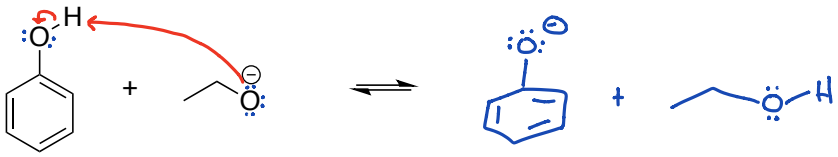
You Try 4-3

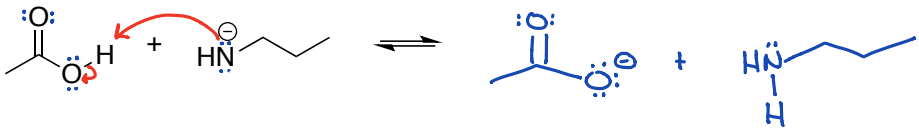
Identify each of the following as: an acid, a base, neither an acid nor a base, or both an acid and a base.

 Acid and Base	 any of the 8 H's could serve as the proton source. Acid	 It is a very weak base, but the lone pairs do make F basic. Acid and Base
 Base (very weak)	 Acid and Base	 Base

You Try 4-4

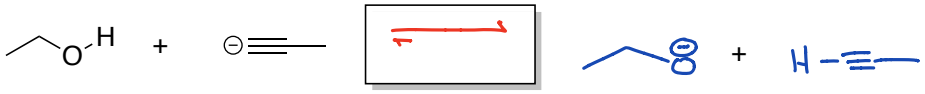
Predict the products for each of the following acid/base reactions



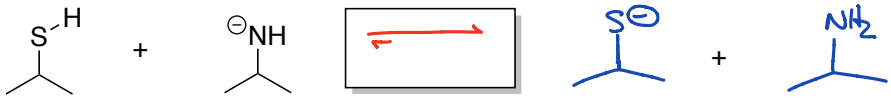


You Try 4-5

For each reaction below, predict the products, write the pKa of the acid and conjugate acid, and predict the direction of the reaction equilibrium.



	Acid	Base		Conj. Base	Conj. Acid
			lies to the right		
pK_a	16				25



	Acid	Base		Conj. Base	Conj. Acid
			lies to the right		
pK_a	11				35

You Try 4-6

Using the table below, rank the compounds from most basic (1) to least basic (4).

$CH_3\overset{\oplus}{N}H_3$	pKa 10
CH_3NH_2	pKa 35
$CH_3\overset{\oplus}{O}H_2$	pKa -3
CH_3OH	pKa 16

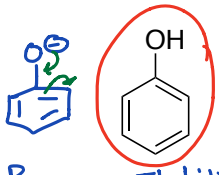
$CH_3O^{\ominus}$	CH_3OH	$CH_3\overset{\ominus}{N}H$	CH_3NH_2
2	4	1	3
Conj acid pKa: 16	-3	35	10

If the conjugate acid has a higher pKa, the base is less stable and more basic

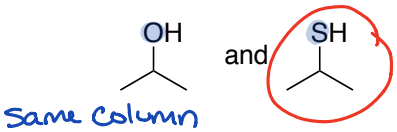
You Try 4-7

For each pair below, identify the more acidic species.

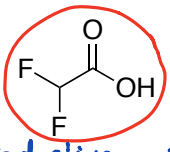
Same column
Br is larger than F



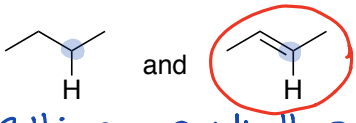
Resonance stabilized conjugate base



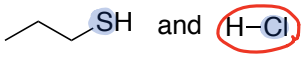
Same column
S is larger than O



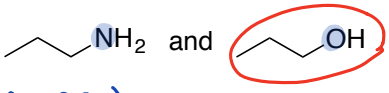
Inductive Effect
F is more e⁻ neg than Cl



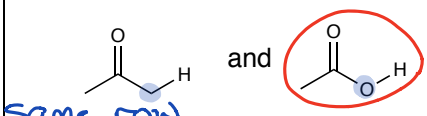
sp^2 C-H is more acidic than sp^3 C-H



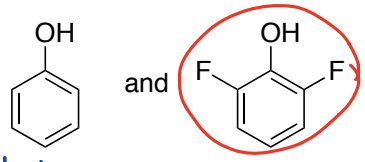
Same row
Cl is more electronegative than S



Same row
O is more electronegative than N



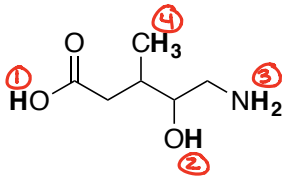
Same row
O is more electronegative than C

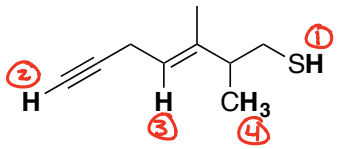


Inductive Effect

You Try 4-8

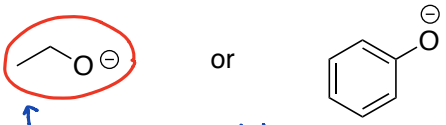
Rank the indicated protons in each molecule below from most acidic (1) to least acidic (4).



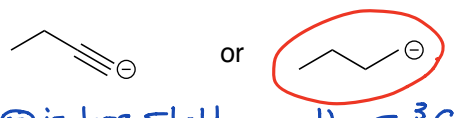


You Try 4-9

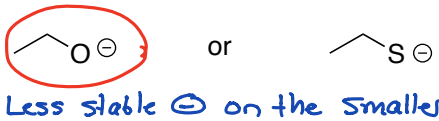
Circle the stronger base in each pair below.



↑ no resonance stability



⊖ is less stable on the sp^3 C



Less stable ⊖ on the smaller atom

* The less stable ⊖ will be the stronger base.