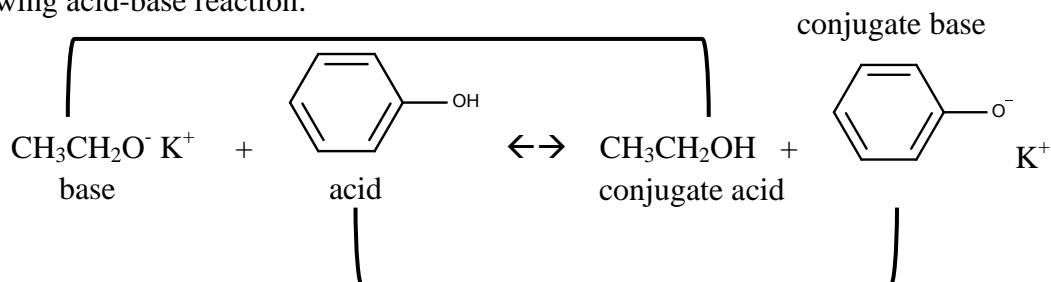


## Organic Chemistry Practice Problems

### Organic Chemistry I Practice Set #1 (Chapter 1 – Carey)

Consider the following acid-base reaction:



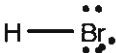
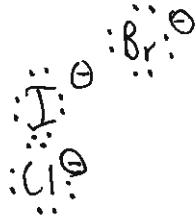
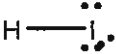
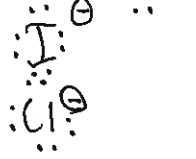
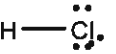
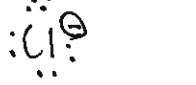
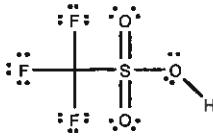
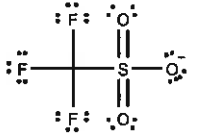
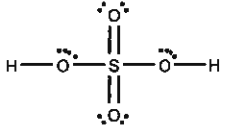
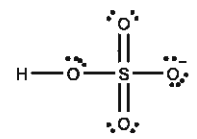
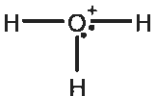
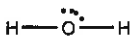
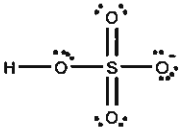
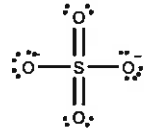
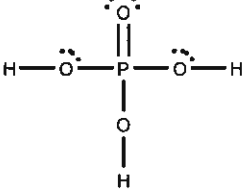
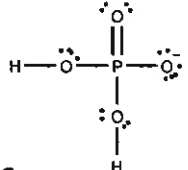
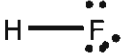

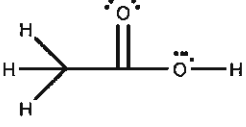
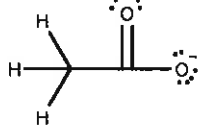
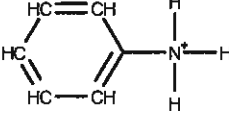
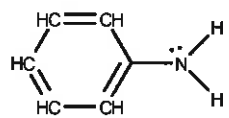
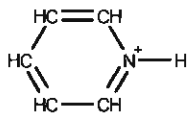
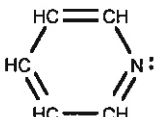
To decide on which side the equilibrium lies:

- 1) Identify conjugate acid-base pairs (connect above with lines);
- 2) If you know the  $pK_a$  values (or they are given), the equilibrium lies **AWAY FROM THE STRONGER ACID**. The stronger acid has lower  $pK_a$

Instructions: **Draw the correct Lewis Structures for each acid and conjugate base in the table below. Place a \* (star) next to each one that has resonance structure(s). HA = acid; A<sup>-</sup> = conjugate base**

HA	$pK_a$	A <sup>-</sup>	HA	$pK_a$	A <sup>-</sup>
HI	-10	I <sup>-</sup>	CH <sub>3</sub> CH <sub>2</sub> NH <sub>3</sub> <sup>+</sup>	11	CH <sub>3</sub> CH <sub>2</sub> NH <sub>2</sub>
HBr	-6	Br <sup>-</sup>	CH <sub>3</sub> COCH <sub>2</sub> CO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>	11	[CH <sub>3</sub> COCHCO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub> ] <sup>-</sup>
HCl	-4	Cl <sup>-</sup>	HPO <sub>4</sub> <sup>2-</sup>	12	PO <sub>4</sub> <sup>3-</sup>
CF <sub>3</sub> SO <sub>3</sub> H	-6	CF <sub>3</sub> SO <sub>3</sub> <sup>-</sup>	(CH <sub>3</sub> CH <sub>2</sub> O <sub>2</sub> C) <sub>2</sub> CH <sub>2</sub>	13	(CH <sub>3</sub> CH <sub>2</sub> O <sub>2</sub> C) <sub>2</sub> CH <sup>-</sup>
H <sub>2</sub> SO <sub>4</sub>	-5	HSO <sub>4</sub> <sup>-</sup>	(NH <sub>2</sub> ) <sub>2</sub> C=NH <sub>2</sub> <sup>+</sup>	13	(NH <sub>2</sub> ) <sub>2</sub> C=NH
H <sub>3</sub> O <sup>+</sup>	-2	H <sub>2</sub> O	CH <sub>3</sub> CONH <sub>2</sub>	14	CH <sub>3</sub> CONH <sup>-</sup>
HSO <sub>4</sub> <sup>-</sup>	2	SO <sub>4</sub> <sup>2-</sup>	H <sub>2</sub> O	15.7	HO <sup>-</sup>
H <sub>3</sub> PO <sub>4</sub>	2	H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>	CH <sub>3</sub> OH	15.2	CH <sub>3</sub> O <sup>-</sup>
HF	3.5	F <sup>-</sup>	CH <sub>3</sub> CH <sub>2</sub> OH	16	CH <sub>3</sub> CH <sub>2</sub> O <sup>-</sup>
CH <sub>3</sub> CO <sub>2</sub> H	4.7	CH <sub>3</sub> CO <sub>2</sub> <sup>-</sup>	(CH <sub>3</sub> ) <sub>2</sub> CHOH	17	(CH <sub>3</sub> ) <sub>2</sub> CHO <sup>-</sup>
PhNH <sub>3</sub> <sup>+</sup>	4.6	PhNH <sub>2</sub>	(CH <sub>3</sub> ) <sub>3</sub> COH	18	(CH <sub>3</sub> ) <sub>3</sub> CO <sup>-</sup>
C <sub>5</sub> H <sub>5</sub> N <sup>+</sup> H (pyridinium)	5.2	C <sub>5</sub> H <sub>5</sub> N	CH <sub>3</sub> COCH <sub>3</sub>	19	CH <sub>3</sub> COCH <sub>2</sub> <sup>-</sup>
H <sub>2</sub> CO <sub>3</sub>	6.4	HCO <sub>3</sub> <sup>-</sup>	CH <sub>3</sub> CO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>	25	<sup>-</sup> CH <sub>3</sub> CO <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>	7	HPO <sub>4</sub> <sup>2-</sup>	HC≡CH	26	HC≡C <sup>-</sup>
H <sub>2</sub> S	7	HS <sup>-</sup>	H <sub>2</sub>	35	H <sup>-</sup>
PhSH	7	PhS <sup>-</sup>	NH <sub>3</sub>	36	NH <sub>2</sub> <sup>-</sup>
NH <sub>4</sub> <sup>+</sup>	9	NH <sub>3</sub>	PhCH <sub>3</sub>	41	[PhCH <sub>2</sub> ] <sup>-</sup>
(CH <sub>3</sub> CO) <sub>2</sub> CH <sub>2</sub>	9	(CH <sub>3</sub> CO) <sub>2</sub> CH <sup>-</sup>	CH <sub>2</sub> =CHCH <sub>3</sub>	43	[CH <sub>2</sub> =CHCH <sub>2</sub> ] <sup>-</sup>
HCN	9	CN <sup>-</sup>	PhH	43	Ph <sup>-</sup>
PhOH	10	PhO <sup>-</sup>	CH <sub>2</sub> =CH <sub>2</sub>	45	[CH <sub>2</sub> =CH] <sup>-</sup>
HCO <sub>3</sub> <sup>-</sup>	10	CO <sub>3</sub> <sup>2-</sup>	CH <sub>3</sub> CH <sub>3</sub>	62	[CH <sub>3</sub> CH <sub>2</sub> ] <sup>-</sup>
CH <sub>3</sub> SH	11	CH <sub>3</sub> S <sup>-</sup>			

## Organic Chemistry Practice Problems

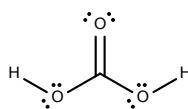
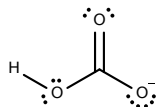
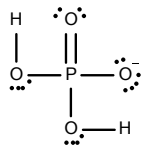
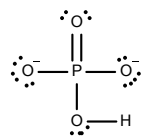
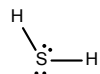

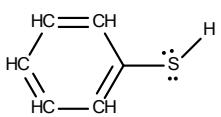
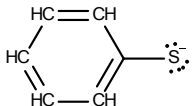
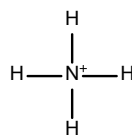
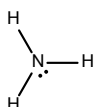
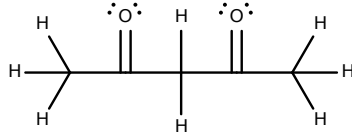
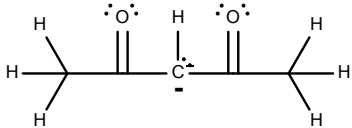
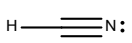
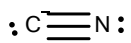
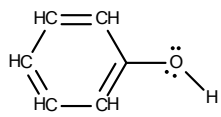
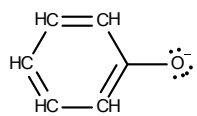
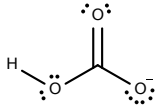
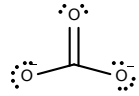
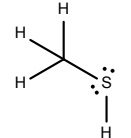
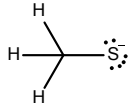
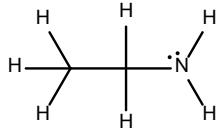
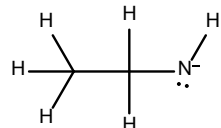
Acids	Organic Chemistry I Answers to Practice Set #1 (Chapter 1 - Carey)	Conjugate Bases
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	HI	
	HCl	
	CF <sub>3</sub> SO <sub>3</sub> H ***	
	H <sub>2</sub> SO <sub>4</sub> ***	
	H <sub>3</sub> O <sup>+</sup>	
	HSO <sub>4</sub> <sup>-</sup> ***	
	H <sub>3</sub> PO <sub>4</sub> ***	
	HF	
	CH <sub>3</sub> CO <sub>2</sub> H	
	PhNH <sub>3</sub> <sup>+</sup> ***	
	C <sub>5</sub> H <sub>5</sub> N <sup>+</sup> H ***	

## Organic Chemistry Practice Problems

### Acids

### Organic Chemistry I Answers to Practice Set #1 (Chapter 1 - Carey)

### Conjugate Bases

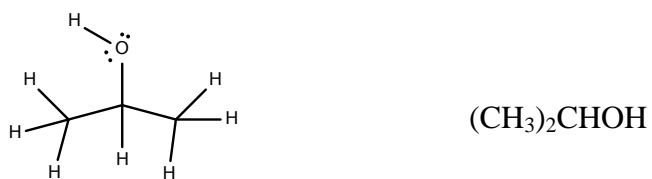
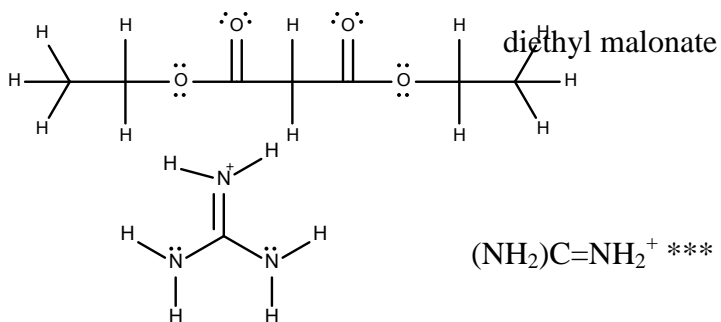
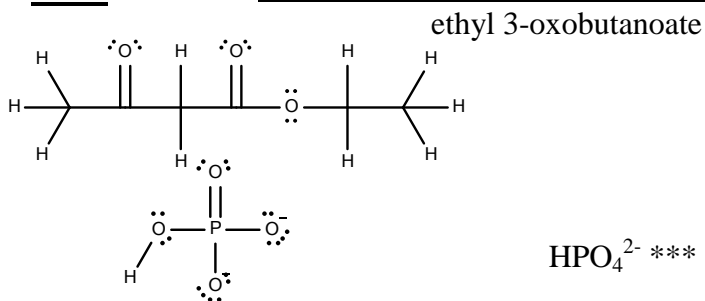
	$\text{H}_2\text{CO}_3$	*** $\text{HCO}_3^-$	
	$\text{H}_2\text{PO}_4^-$ ***	*** $\text{HPO}_4^{2-}$	
	$\text{H}_2\text{S}$	$\text{HS}^-$	
	$\text{PhSH}$ ***	*** $\text{PhS}^-$	
	$\text{NH}_4^+$	$\text{NH}_3$	
	$(\text{CH}_3\text{CO})_2\text{CH}_2$	*** $(\text{CH}_3\text{CO})_2\text{CH}^-$	
	$\text{HCN}$	$\text{CN}^-$	
	$\text{PhOH}$ ***	*** $\text{PhO}^-$	
	$\text{HCO}_3^-$ ***	*** $\text{CO}_3^{2-}$	
	$\text{CH}_3\text{SH}$	$\text{CH}_3\text{S}^-$	
	$\text{CH}_3\text{CH}_2\text{NH}_2$	$\text{CH}_3\text{CH}_2\text{NH}^-$	

# Organic Chemistry Practice Problems

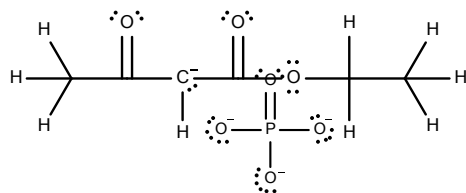
## Acids

## Organic Chemistry I Answers to Practice Set #1 (Chapter 1 – Carey)

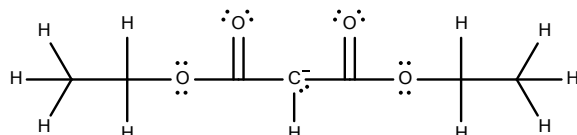
## Conjugate Bases



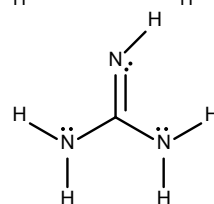
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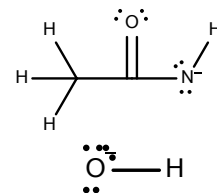
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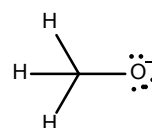
$(\text{NH}_2)\text{C}=\text{NH}$



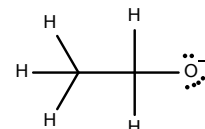
\*\*\*  $\text{CH}_3\text{CONH}^-$



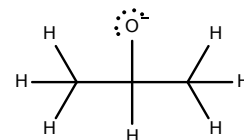
$\text{OH}^-$



$\text{CH}_3\text{O}^-$

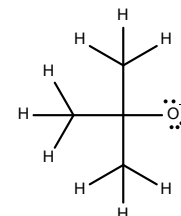


$\text{CH}_3\text{CH}_2\text{O}^-$



$(\text{CH}_3)_2\text{CHO}^-$

$(\text{CH}_3)_3\text{O}^-$



## Organic Chemistry Practice Problems

### Acids

### Organic Chemistry I Answers to Practice Set #1 (Chapter 1 – Carey)

### Conjugate Bases

