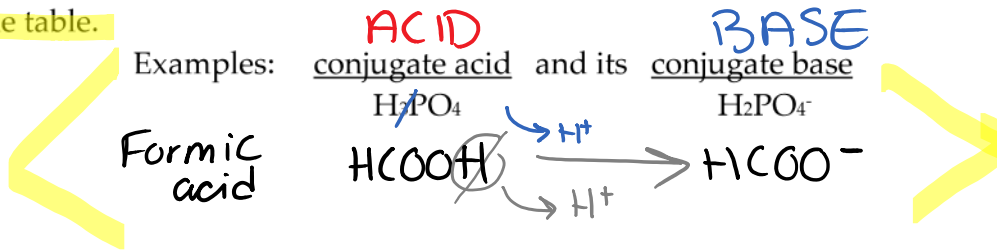


VII) Conjugate Acid-Base Pairs

January 17, 2018 11:06 PM

VII) Conjugate Acid-Base Pairs

Conjugate acid/base pairs are **particles that directly oppose each other on the table.**



* Is HCl / Cl⁻ a conjugate acid/base pair?
 Technically yes... the Cl⁻ ion exists and we call it a "conjugate base", although it will **NEVER** act as a base => **the rxn is not reversible** Cl⁻ will not accept a H⁺

What is the difference between a conjugate acid and its conjugate base?

They differ by **1 H⁺ proton**

A base has one **LESS** ⊖ proton than its conjugate acid, and an acid has one **MORE** ⊕ proton than its conjugate base.

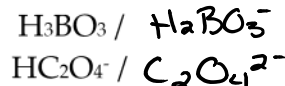
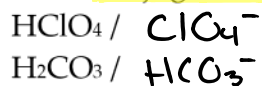
Remember to adjust the charge when writing a conjugate.

Example: Write the conjugate base of NH₄⁺: $\text{NH}_4^+ \xrightarrow{-\text{H}^+} \text{NH}_3$ ← neutral charge.

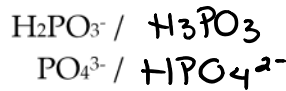
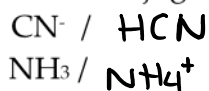
Write the conjugate base of CH₃COOH: $\text{CH}_3\text{COOH} \xrightarrow{-\text{H}^+} \text{CH}_3\text{COO}^-$

Write the conjugate acid of HPO₄²⁻: $\text{HPO}_4^{2-} \xrightarrow{+\text{H}^+} \text{H}_2\text{PO}_4^-$ (2⁻ + 1⁺ = -1)

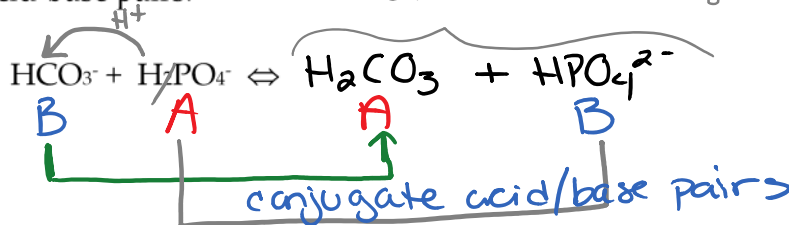
What is the **conjugate base** of each?



What is the **conjugate acid** of each?



Using your table, complete the following equation and identify the conjugate acid-base pairs. **which is the stronger acid?**



Acid




↑ stronger



* still label the acid/base pair... BUT make sure you have →

HCO_3^- base.

* still label the acid/base pair.... BUT make sure you have  one way! arrows!

Remember: Strong acids (such as HCl) have a conjugate base (Cl^-) - even though it's not a base at all), but they are not at equilibrium.
Strong bases such as NaOH have a conjugate acid (Na^+) (even though it's not an acid at all), but they are not at equilibrium.

Assignment 4: Complete each equation and identify conjugate acid-base pairs

1. $\text{HNO}_3 + \text{H}_2\text{O} \Rightarrow$
2. $\text{H}_2\text{O} + \text{HNO}_2 \Leftrightarrow$
3. $\text{HIO}_3 + \text{NH}_3 \Leftrightarrow$
4. $\text{CO}_3^{2-} + \text{HF} \Leftrightarrow$
5. $\text{HS}^- + \text{H}_3\text{PO}_4 \Leftrightarrow$
6. $\text{HCO}_3^- + \text{CN}^- \Leftrightarrow$
7. $\text{H}_3\text{BO}_3 + \text{HO}_2^- \Leftrightarrow$
8. $\text{C}_2\text{O}_4^{2-} + \text{H}_2\text{O} \Leftrightarrow$
9. $\text{H}_2\text{O} + \text{H}_2\text{SO}_3 \Leftrightarrow$
10. Hebden p. 121 #17-19