

Name: _____

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ACID BASES UNIT
Lesson #5
CONJUGATE ACIDS AND BASES

A conjugate ACID-BASE PAIR is a pair of chemical species that differ by only one proton

CONJUGATE ACID- has an extra proton

CONJUGATE BASE- has one less proton

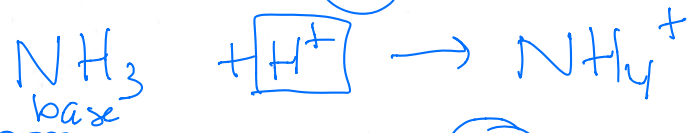
Example 1. In the equilibrium reaction $\text{NH}_4^+ + \text{H}_2\text{O} \rightleftharpoons \text{NH}_3 + \text{H}_3\text{O}^+$ there are **TWO CONJUGATE PAIRS**

| CONJUGATE PAIR | CONJUGATE ACID | CONJUGATE BASE |
|--|------------------------|----------------------|
| a. $\text{NH}_4^+ / \text{NH}_3$ | NH_4^+ | NH_3 |
| b. $\text{H}_2\text{O} / \text{H}_3\text{O}^+$ | H_3O^+ | H_2O |

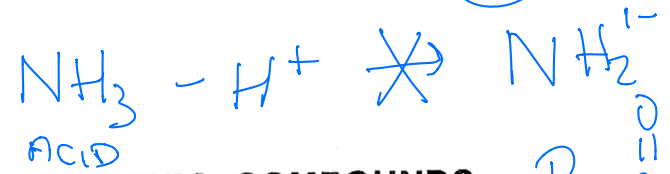
Example 2. Given the following conjugate pairs, identify the conjugate acid and the conjugate base:

| | ACID | BASE |
|---|------------------------------|---------------------|
| $\text{H}_2\text{PO}_4^{1-}, \text{HPO}_4^{2-}$ | $\text{H}_2\text{PO}_4^{1-}$ | HPO_4^{2-} |
| $\text{S}^{2-}, \text{HS}^-$ | HS^- | S^{2-} |
| $\text{HCO}_3^-, \text{CO}_3^{2-}$ | HCO_3^- | CO_3^{2-} |

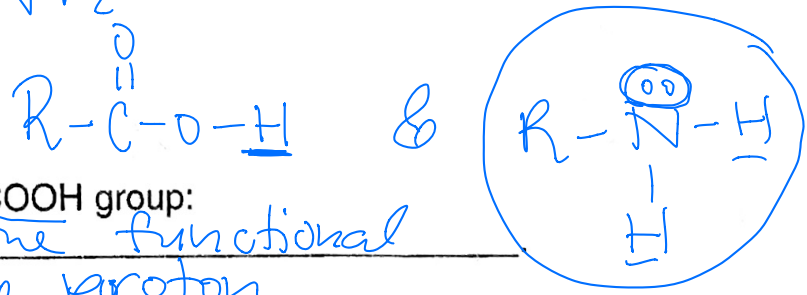
Example 3.
a. What is the conjugate ACID of NH_3 ? BASE



* b. What would be the conjugate BASE of NH_3 ?



A NOTE on ORGANIC COMPOUNDS:



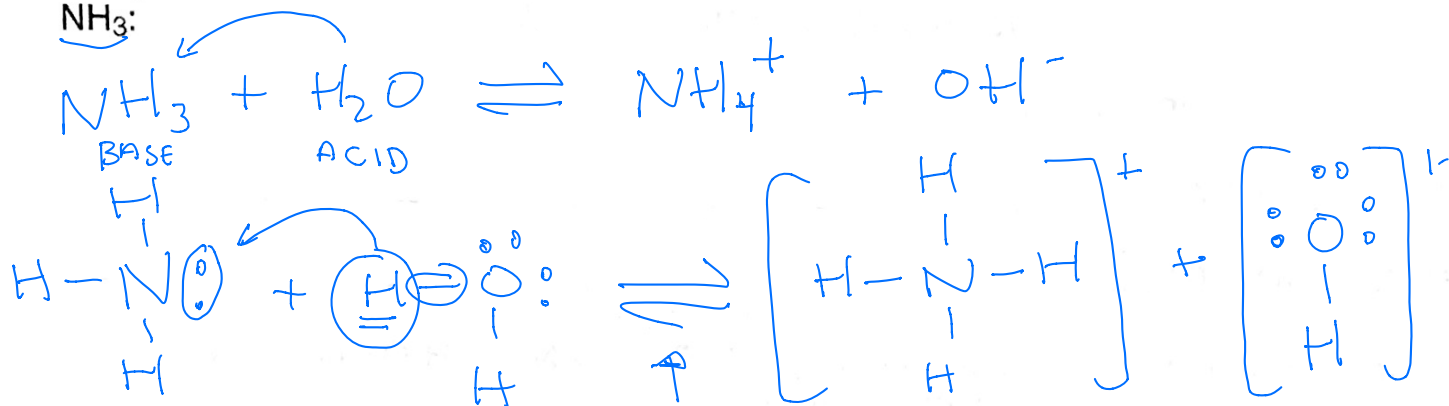
ORGANIC ACIDS, substances containing a COOH group:

The H @ the end of the functional group is the donateable proton

ORGANIC BASES, substances containing either an NH_2 group or an NH group:

It is the unpaired set of electrons that receives the proton

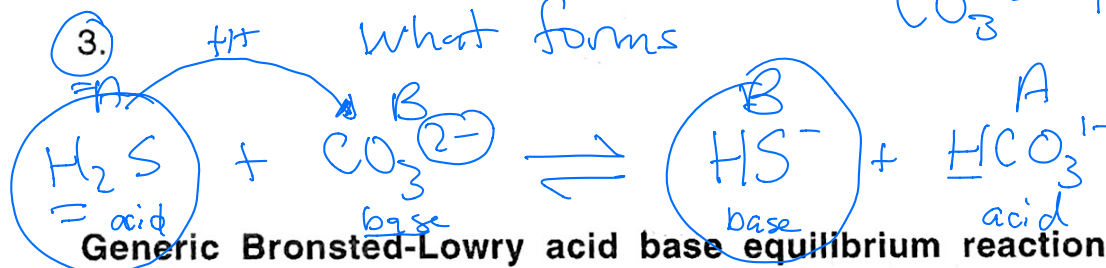
Using LEWIS DOT STRUCTURES we can visualize the reaction between water and NH₃:



Example 4. Write the acid-base equilibrium which occurs when H₂S and CO₃²⁻ are mixed in solution:

1. How will each species react?

2. H₂S vs CO₃²⁻ ∴ H₂S is the acid
CO₃²⁻ is the base



Generic Bronsted-Lowry acid base equilibrium reaction looks like:

