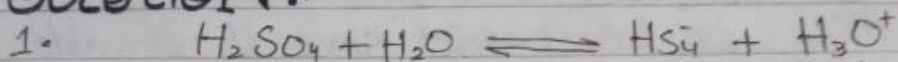


SELF-ASSESSMENT Exercise 22

Identify Bronsted acids and Bronsted bases in the following reactions.

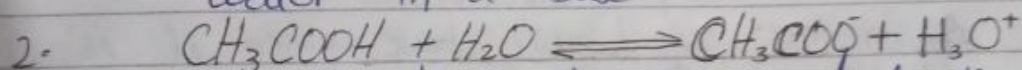
- $H_2SO_4 + H_2O \rightleftharpoons HSO_4^- + H_3O^+$
- $CH_3COOH + H_2O \rightleftharpoons CH_3COO^- + H_3O^+$
- $H_2S + NH_3 \rightleftharpoons NH_4^+ + HS^-$

SOLUTION:-



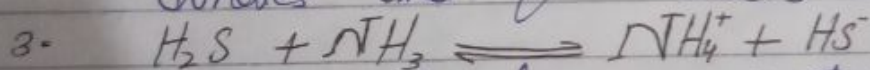
Because H_2SO_4 is converted to HSO_4^- by donating proton, H_2SO_4 is an acid.

Because H_2O accepts the proton that H_2SO_4 donates and forms H_3O^+ water is a base.



Because CH_3COOH is converted to CH_3COO^- by donating proton, CH_3COOH is an acid.

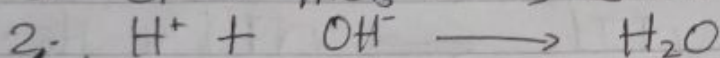
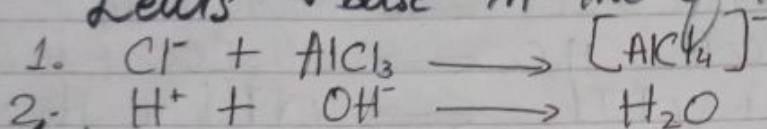
Because H_2O accepts the proton that CH_3COOH donates and forms H_3O^+ water is a base.



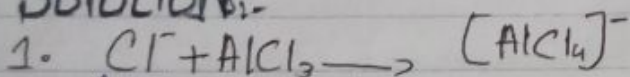
H_2S is donating a proton, so H_2S is an acid. Because NH_3 accepts the proton and forms NH_4^+ so it is a base.

SELF ASSESSMENT EXERCISE 10.2

Identify the Lewis acid and the Lewis base in the following examples.

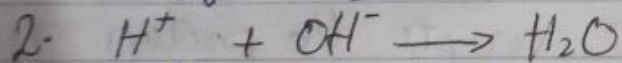


Solutions:



AlCl_3 is Lewis acid since it is able to accept electrons.

Anion Cl^- Lewis base since it is able to donate electrons.



Cation H^+ is Lewis acid since it is able to accept electrons.

Anion OH^- is Lewis base since it is able to donate electrons.

SELF-ASSESSMENT EXERCISE 10.3

1. A soft drink has $[H^+] = 3 \times 10^{-3} M$. Is the drink acidic, natural, or basic?
2. Ordinary vinegar is approximately 1M CH_3COOH . Concentration of H^+ in it is $4.2 \times 10^{-3} M$. Is vinegar acidic, basic, or natural?
3. A student determines the $[OH^-]$ of milk of magnesia, a suspension of solid magnesium hydroxide in its saturated solution and obtains a value of $4.2 \times 10^{-3} M$. Is the solution acidic, basic, or natural?

Solution:

1. $[H^+] = 3 \times 10^{-3} M > 1.0 \times 10^{-7} M$, the solution is acidic.
2. $[H^+] = 4.2 \times 10^{-3} M > 1.0 \times 10^{-7} M$, the solution is acidic.
3. $[OH^-] = [4.2 \times 10^{-3}]$

$$[H^+] = ?$$

$$K_w = [H^+][OH^-]$$

$$1.0 \times 10^{-14} = [H^+][4.2 \times 10^{-3}]$$

$$[H^+] = \frac{1.0 \times 10^{-14}}{4.2 \times 10^{-3}}$$

$$[H^+] = 0.2 \times 10^{-11} M$$

Because $0.2 \times 10^{-11} M < 1.0 \times 10^{-7} M$, the solution is basic.

SELF-ASSESSMENT EXERCISES

- Hydroxides such as $Mg(OH)_2$ called milk of magnesia is used as antacid. It neutralizes excess stomach acid (HCl). Write complete and balanced chemical equation for this neutralization reaction?
- Hydrochloric acid (HCl) and potassium hydroxide (KOH) react and produce potassium chloride. Write complete and balanced chemical equation for this neutralization reactions?
- Balance following neutralization reactions
 - $H_2SO_4(aq) + NaOH(aq) \rightarrow Na_2SO_4(aq) + H_2O(l)$
 - $H_3PO_4(aq) + NaOH(aq) \rightarrow Na_3PO_4(aq) + H_2O(l)$

Solution

- $Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$
 - $KOH + HCl \rightarrow KCl + H_2O$
- Balance following neutralization reactions
 - $H_2SO_4(aq) + 2NaOH(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l)$
 - $H_3PO_4(aq) + 3NaOH(aq) \rightarrow Na_3PO_4(aq) + 3H_2O(l)$

Self-Assessment Exercise 10-6

Classify following salts as normal or acid salt.

- (a) NaHSO_4
- (b) Na_2SO_4
- (c) KHCO_3
- (d) K_2CO_3

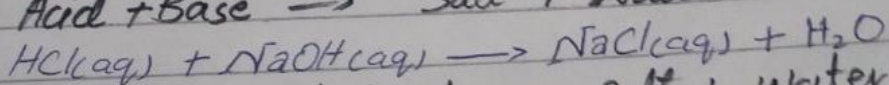
Solution:

- (a) NaHSO_4 is an acidic salt.
 - (b) Na_2SO_4 is a normal salt.
 - (c) KHCO_3 is a normal salt.
- Q46. Write five methods for making salts?

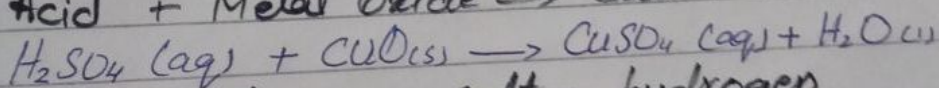
Ans.: METHODS FOR MAKING SALTS \Rightarrow

There are five methods for making salts.

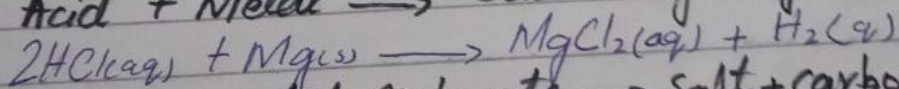
1. Acid + Base \rightarrow Salt + Water



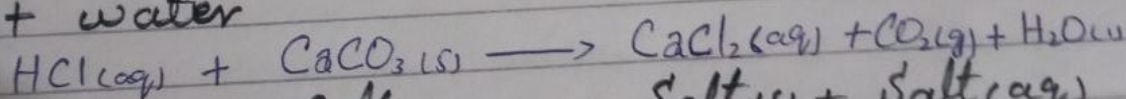
2. Acid + Metal Oxide \rightarrow Salt + Water



3. Acid + Metal \rightarrow Salt + hydrogen



4. Acid + Metal Carbonate \rightarrow Salt + carbon dioxide + water



5. Salt(aq) + Salt(aq) \rightarrow Salt(s) + Salt(aq)

