

# ACID + BASES

## DEFINITIONS:

### ARRHENIUS

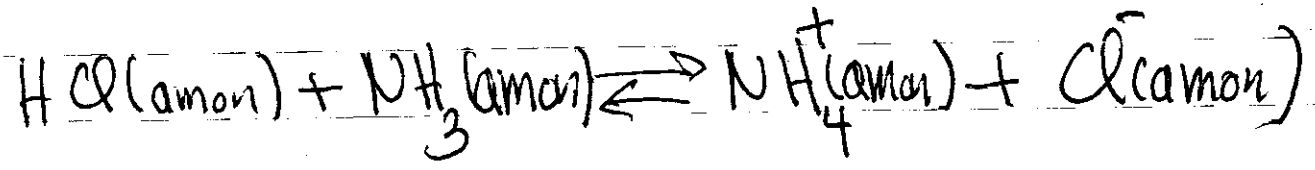
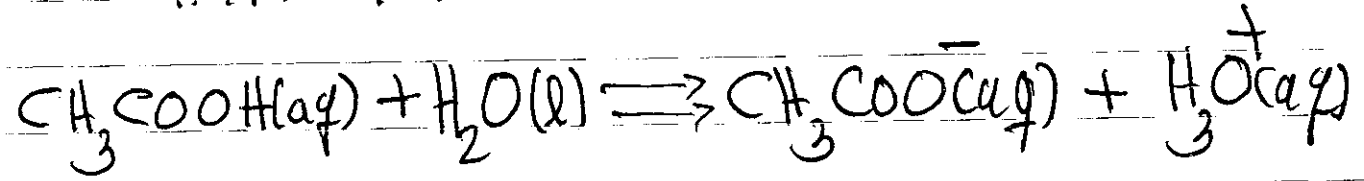
Acid is a substance that when dissolved in water increases the conc. of hydronium,  $H_3O^+(aq)$ , above the value it takes in pure water.

Base increases the conc. of  $OH^-(aq)$ .

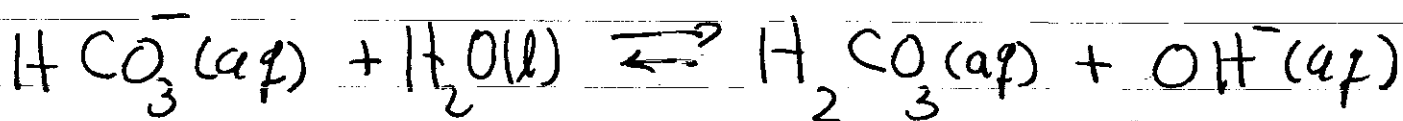
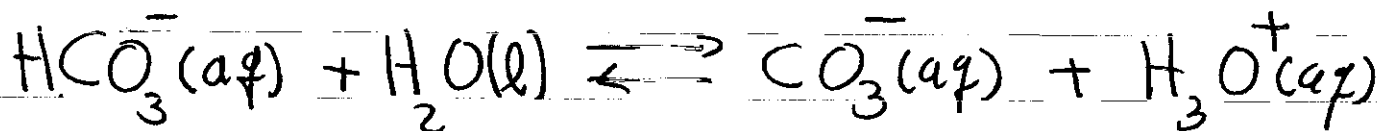
### BROWSTED-LOWRY (1923)

ACID IS DEFINED AS A SUBSTANCE THAT CAN DONATE A HYDROGEN ION.

BASE IS A SUBSTANCE THAT CAN ACCEPT A HYDROGEN ION.



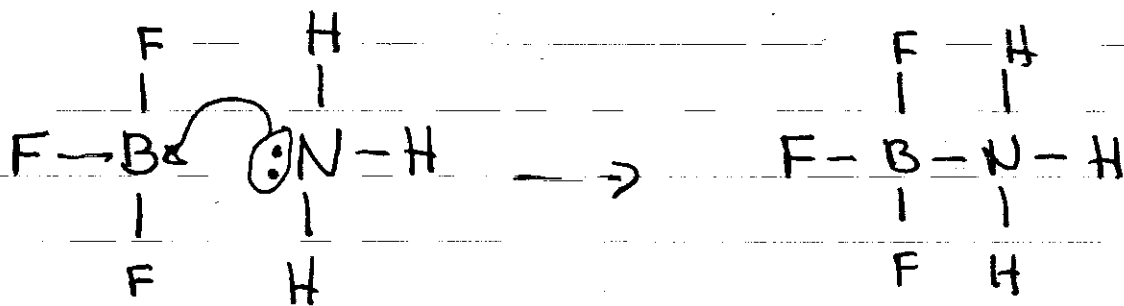
AMPHOTERIC: SUBSTANCES THAT CAN FUNCTION EITHER AS ACID OR BASE DEPENDING ON THE REACTION CONDITIONS



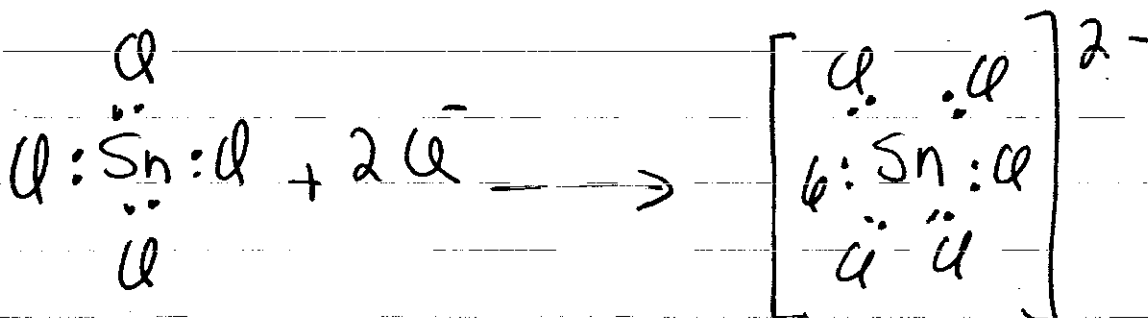
### LEWIS ACIDS AND BASES

LEWIS ACIDS ACCEPTS LONE-PAIR ELECTRONS

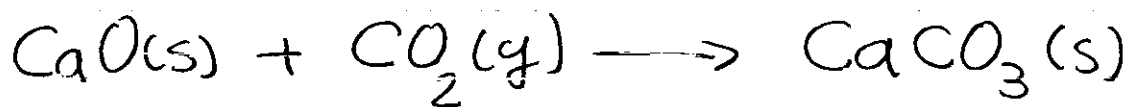
LEWIS BASE DONATES LONE-PAIR ELECTRONS



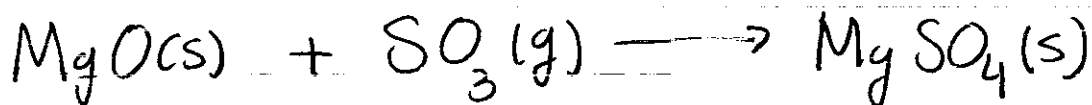
OCTET RULE MAY NOT BE SATISFIED



## LEWIS ACID-BASE RXN.



NO CHANGE IN OXIDATION NUMBER

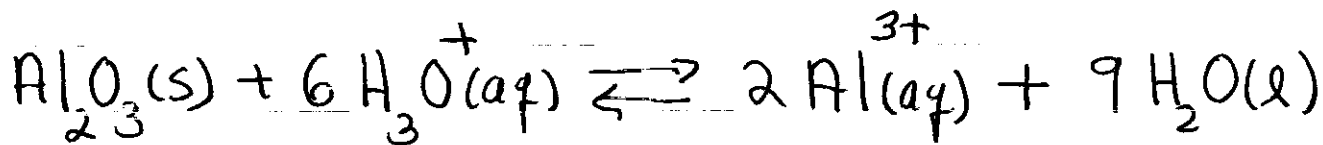


BASE                  ACID

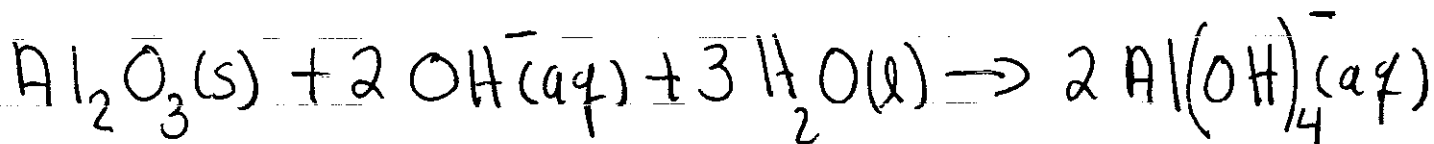
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AMPHOTERIC  $\text{Al}_2\text{O}_3(s)$

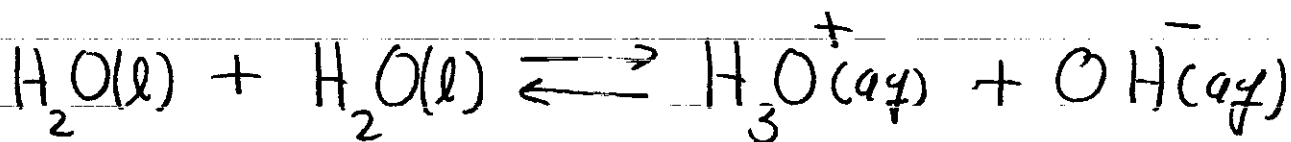
AS A BASE



AS AN ACID



# WATER



$$K_w = [\text{H}_3\text{O}^+][\text{OH}^-]$$

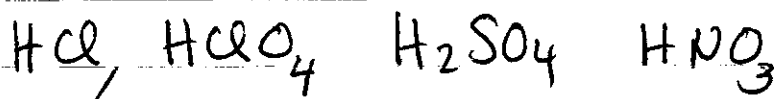
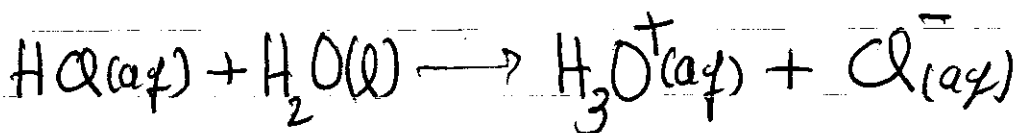
WITH  $[\text{H}_3\text{O}^+] = [\text{OH}^-]$

AT 25 °C

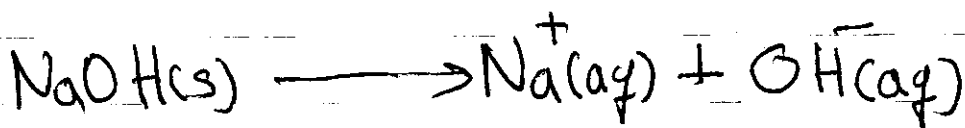
$$K_w = 1.00 \times 10^{-14}$$

$$[\text{H}_3\text{O}^+] = [\text{OH}^-] = 1.00 \times 10^{-7} \text{ M}$$

STRONG ACIDS IONIZE COMPLETELY IN AQUEOUS SOL.  $[\text{H}_3\text{O}^+] \uparrow$



STRONG BASES IONIZE COMPLETELY IN AQUEOUS SOL.  $[\text{OH}^-] \uparrow$



pH

$$\text{pH} \equiv -\log_{10} [\text{H}_3\text{O}^+]$$

conc.  $[\text{H}_3\text{O}^+]$  in  $\text{mol L}^{-1}$

AT  $25^\circ\text{C}$

$$[\text{H}_3\text{O}^+] = 1.00 \times 10^{-7} \text{ M}$$

$$\text{pH} = 7.000$$

$\text{pH} > 7.00$  BASIC

$\text{pH} = 7.00$  NEUTRAL

$\text{pH} < 7.00$  ACIDIC