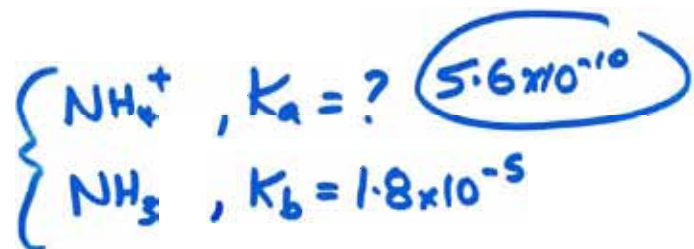


$K_a \cdot K_b = K_w$ $K_b = \frac{K_w}{K_a} = \frac{1.0 \times 10^{-14}}{4.9 \times 10^{-10}} = 2.0 \times 10^{-5}$



$K_a \cdot K_b = K_w \Rightarrow K_a = \frac{K_w}{K_b} = \frac{1.0 \times 10^{-14}}{1.8 \times 10^{-5}} = 5.6 \times 10^{-10}$

↑ constant



"weak" weak acid ~ "strong" weak base
 conjugate
 + vice versa.

Acid-Base properties of salts

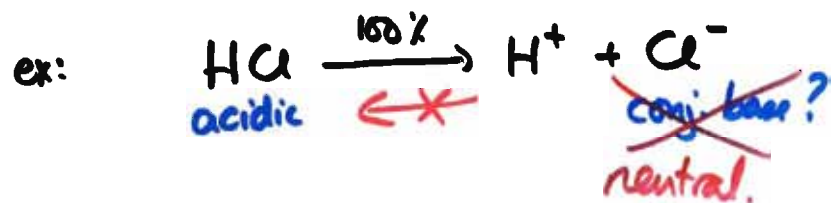
↳ ionic cpd.

| | | |
|-----------|----|-------------------------------|
| weak acid | HA | A ⁻ Anion |
| | | * BASIC * |
| weak base | B | BH ⁺ Cation |
| | | * ACIDIC * |

anions ~ basic
 cations ~ acidic

easy way to remember
 OH⁻ ~ BASIC
 H⁺/H₃O⁺ ~ ACIDIC

But, consider STRONG acids
+ STRONG bases.

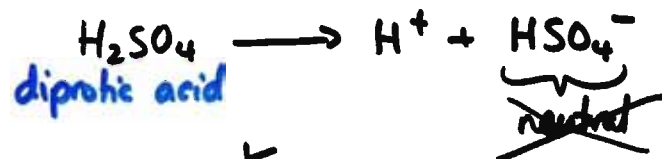
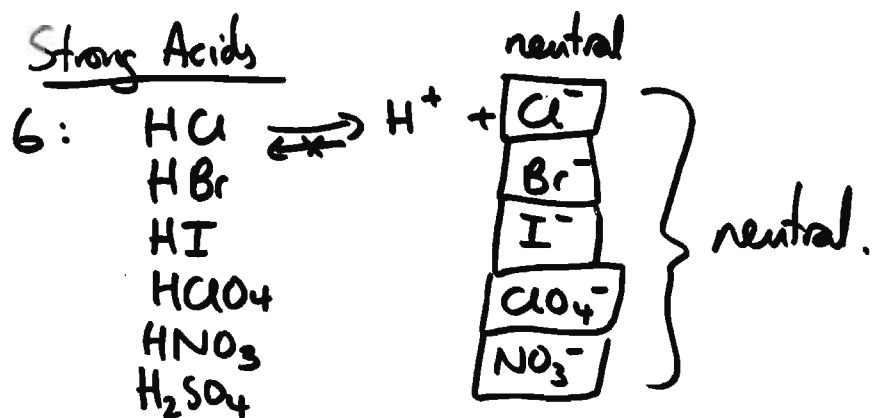


↑
does not react w/ H^+ !

⇒ Anions derived from STRONG acids are neutral.

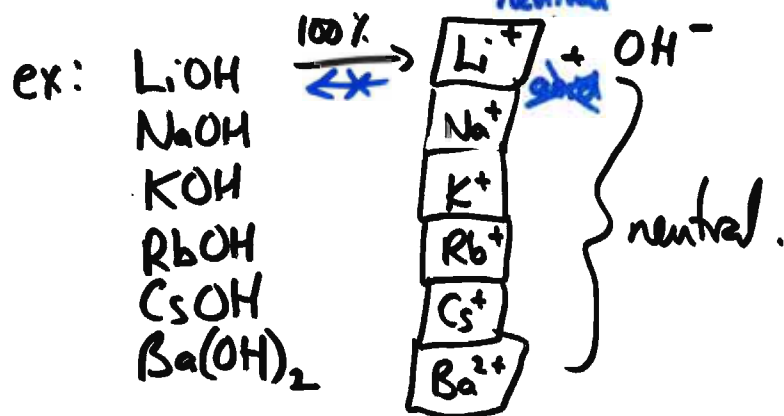
⇒ Anions derived from weak acids are basic.

Strong Acids



- anions from polyprotic acids that still have H^+ to donate are acidic!

all cations are acidic, unless they come from a strong base, in which case they are neutral.

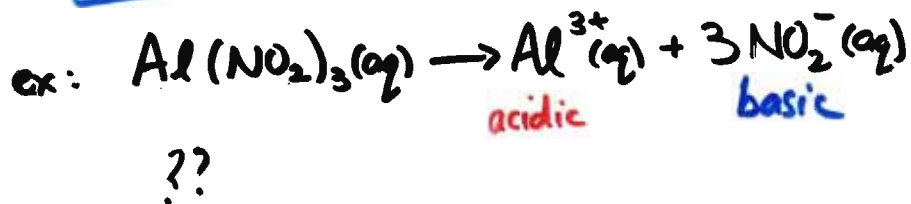
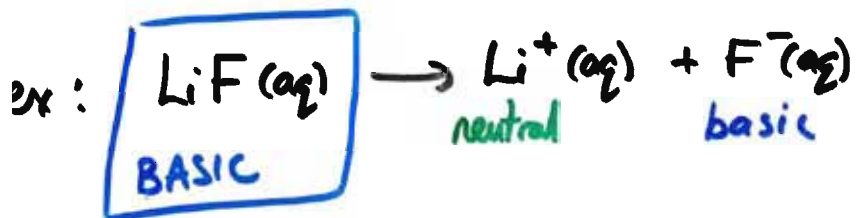


CATIONS
acidic

ANIONS
basic

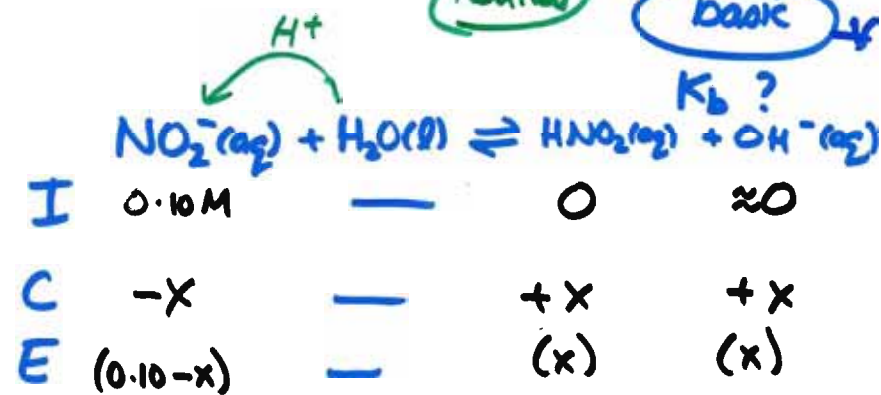
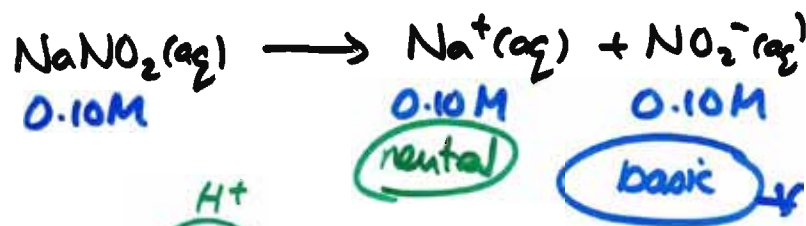
CATIONS from a strong base
neutral.
 $\text{Li}^+, \text{Na}^+, \text{K}^+, \text{Rb}^+, \text{Cs}^+, \text{Ba}^{2+}$

ANIONS from a strong acid
neutral
 $\text{Cl}^-, \text{Br}^-, \text{I}^-, \text{NO}_3^-, \text{ClO}_4^-$



ACIDIC if $K_a(\text{Al}^{3+}) > K_b(\text{NO}_2^-)$
 BASIC if $K_b(\text{NO}_2^-) > K_a(\text{Al}^{3+})$
 NEUTRAL if $K_a(\text{Al}^{3+}) = K_b(\text{NO}_2^-)$

What's the pH of 0.10M $\text{NaNO}_2(\text{aq})$?



$K_b = \frac{[\text{HNO}_2][\text{OH}^-]}{[\text{NO}_2^-]}$ eq

$2.2 \times 10^{-10} = \frac{(x)(x)}{0.10-x}$

~~$K_b(\text{NO}_2^-) = ?$~~
 $K_a \cdot K_b = K_w$
 $\text{HNO}_2 \quad \text{NO}_2^-$

$$K_a(\text{HNO}_2) = 4.5 \times 10^{-4}$$

$$\Rightarrow K_b(\text{NO}_2^-) = \frac{K_w}{K_a} = 2.2 \times 10^{-11}$$