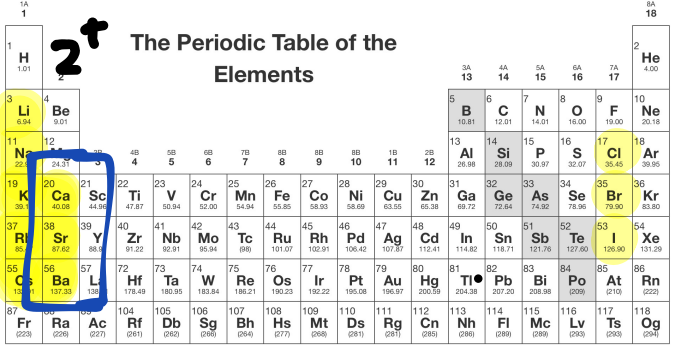


HNO_3
$HClO_3$
$HClO_4$
H_2SO_4

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

$$K_w = 1 \times 10^{-14}$$

Acid: able to donate a H^+

Base: able to accept a H^+

$$pH = -\log[H^+]$$

$$pOH = -\log[OH^-]$$

1, 2, 3...

- a high value of $[H^+]$ will have a low pH / high pOH
- a high value of $[OH^-]$ will have a high pH / low pOH

1. What is the pH of a 0.50M HNO_3 solution?

(strong acid) → 100% → H^+ (0.5) + NO_3^- (0.5)

$$pH = -\log [H^+]$$

$$= -\log (0.50\ M)$$

$$pH = 0.30$$

"M" = $[H^+]$

2. What is the hydrogen ion concentration of a 0.30M calcium hydroxide solution?

$Ca(OH)_2$

Strong Base

100 $Ca(OH)_2$ → 100% → 100 Ca^{2+}

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

2 eq. OH^-

200 OH^-

$$\frac{1 \times 10^{-14}}{(0.30 \times 2)} = \frac{[H^+](0.30 \times 2)}{(0.30 \times 2)}$$

$$[H^+] = (1EE{-}14)/(0.3 \times 2)$$

$$= \boxed{1.67 \times 10^{-14}\ M}$$

$$pOH = -\log[OH^-]$$

$$= -\log(0.30 \times 2)$$

$$= 0.2218\ldots$$

$pH = 14 - pOH$

$pH = 14 - 0.2218$

$= 13.778$

$[H^+] = 10^{-pH}$

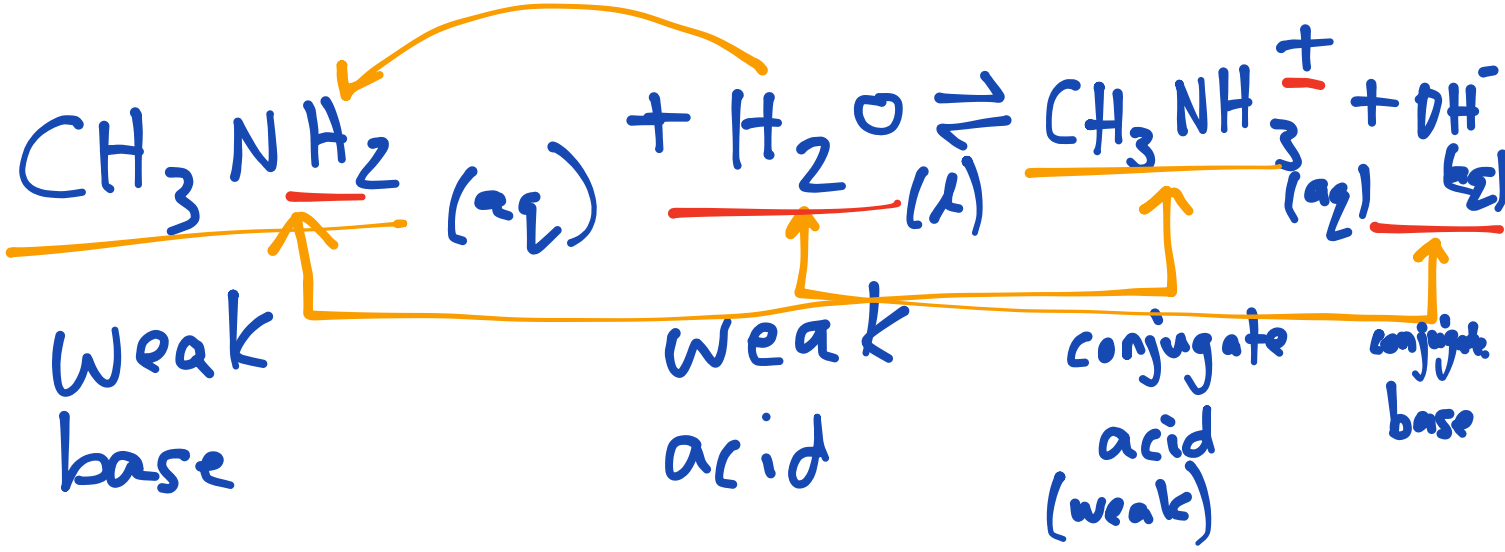
$[H^+] = 10^{-13.778}$

$= 1.67 \times 10^{-14}$ M

$[OH^-] = 10^{-pOH}$

3. You place 0.15 moles of methyl amine into 1L water. What is the conjugate acid & conjugate base?

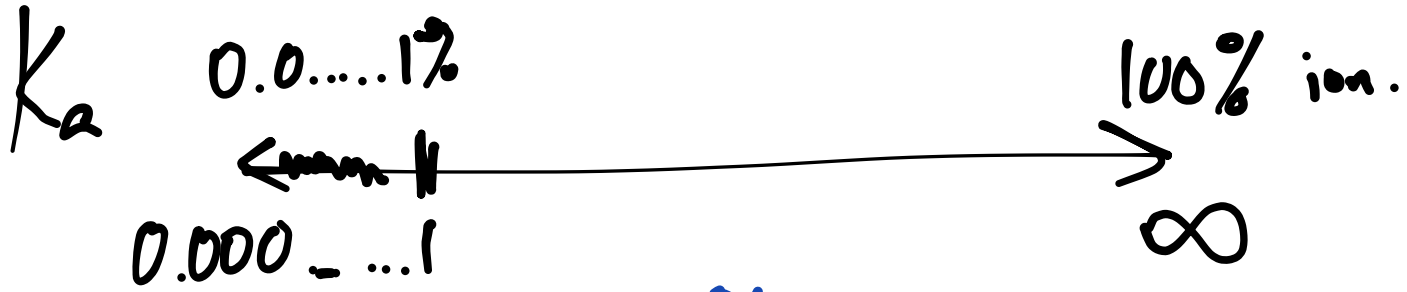
weak base



CA : $CH_3NH_3^+$

CB : OH^-

4. Consider a weak acid "HA" with a % ionization equal to 10% at a 0.1M concentration. What is K_a?



10% of 0.1M

R	HA	$\rightleftharpoons$	H^+	$+ A^-$
I	0.1		0	0
C	−0.01		+0.01	+0.01
E	0.09		0.01	0.01

$$K_a = \frac{[H^+][A^-]}{[HA]}$$

$$K_a = \frac{(0.01)(0.01)}{(0.09)}$$

$$K_a = 0.00111\ldots$$

$$K_a = 1.11 \times 10^{-3}$$