

Find pH of 0.2M HCN(_{aq})
 WA $K_a = 4.9 \times 10^{-10} = \frac{[P]}{[R]}$

Q's
 ① A or B
 ② SA or WA
 R/E
 ③ K_a
 WB $\rightarrow K_b$
 Conj. acid K_a
 $K_a \times K_b = K_w$

I 0.2	0	0	0
D -x	x	x	x
E 0.2-x	x	x	x

$$K_a = \frac{[H_3O^+][CN^-]}{[HCN]} = \frac{(x)(x)}{0.2} = 4.9 \times 10^{-10}$$

$$x = 9.9 \times 10^{-6} = [H_3O^+] = [H^+]$$

$$pH = -\log [H^+] = 5.004$$

$$\% \text{ ionization} = \frac{Part}{Whole} = \frac{9.9 \times 10^{-6}}{0.2} \times 100 \approx 0.00495\%$$

Feb 23-7:30 AM

(16.7b) 0.55M BrO⁻ $K_b = 4 \times 10^{-6}$
 No H or OH \Rightarrow Add water
 Find [OH⁻] and pH.

Base
 H⁺ acceptor
 Need K_b

$$BrO^- + H_2O \rightleftharpoons HBrO + OH^-$$

I 0.55	0	0
D -x	+x	+x
E 0.55-x	x	x

$$K_b = \frac{[HBrO][OH^-]}{[BrO^-]} = \frac{(x)(x)}{0.55} = 4 \times 10^{-6}$$

$$x = 1.48 \times 10^{-3} = [OH^-]$$

$$pOH = -\log [OH^-] \rightarrow pH + pOH = 14 \rightarrow pH = 11.17$$

Feb 23-8:03 AM

1684a Find $[OH^-]$ and pH of 0.105M NaF

Basic Salt ←

$NaF + HOH \rightarrow HF + NaOH$

$Na^+ + F^- + HOH \rightarrow HF + Na^+ + OH^-$

F 0.105			
-x	-x	+x	+x
E 0.105-x	x	x	x

$K_b = \frac{(HF)(OH^-)}{(F^-)} = \frac{(x)(x)}{0.105-x} = 1.47 \times 10^{-11}$

$x = [OH^-] = 1.24 \times 10^{-6}$

$pOH = 5.91$

$pH = 8.09$

① Balance

② Use Net Ion eqn

③ K_b for F^- ?

④ pH (A.S.H.F)

$K_a = 6.8 \times 10^{-4}$

$K_a \times K_b = K_w$

$K_b =$

Feb 23-8:14 AM

Salts → Acidic?
 → Neutral?
 → Basic?

$NaF + HOH \rightarrow HF + NaOH$

Basic Salt

① Add $w_a w_b$!

② SA/SB
WA/WB?

winner!

hydrolyze it

Feb 23-8:16 AM

(16.84) 0.035M Na₂S pH, [OH⁻]

Basic salt ← Na₂S + 2H₂O → H₂S + 2NaOH

2Na⁺ + S²⁻ + 2H₂O → H₂S + 2Na⁺ + 2OH⁻

I	0.035		
Δ	-x	+x	+2x
E	0.035-x	x	2x

$$K_b = \frac{[H_2S][OH^-]^2}{[S^{2-}]} = \frac{(x)(2x)^2}{0.035-x} = 1.05 \times 10^{-7}$$

$$K_b \approx \frac{4x^3}{0.035} = 1.05 \times 10^{-7}$$

$$x = 9.72 \times 10^{-4}$$

$$[OH^-] = 2x = 1.95 \times 10^{-3}$$

pH = 2.71

pH = 11.29

Break up
SA
SB
Soluble salts
K_{a1} = 4.3 × 10⁻⁷
K_{a2} = 5.6 × 10⁻¹¹

Feb 23-8:36 AM

Polyprotic Acid H₂CO₃

① H₂CO₃ → HCO₃⁻ + H⁺

I	0.01		
Δ	-x	+x	+x
E	0.01-x	x	x

$$K_{a1} = \frac{[HCO_3^-][H^+]}{[H_2CO_3]} = \frac{(x)(x)}{0.01-x} = 4.3 \times 10^{-7}$$

$$x = 6.56 \times 10^{-5} = [H^+] = [HCO_3^-]$$

$$6.5574385243 \times 10^{-5}$$

pH = 4.18326577221

② HCO₃⁻ → CO₃²⁻ + H⁺

I	6.56 × 10 ⁻⁵		
Δ	-x	+x	+x
E	6.56 × 10 ⁻⁵ - x	x	x

$$K_{a2} = \frac{[CO_3^{2-}][H^+]}{[HCO_3^-]} = \frac{(x)(6.56 \times 10^{-5} + x)}{6.56 \times 10^{-5} - x} = 5.6 \times 10^{-11}$$

$$x = 5.6 \times 10^{-11}$$

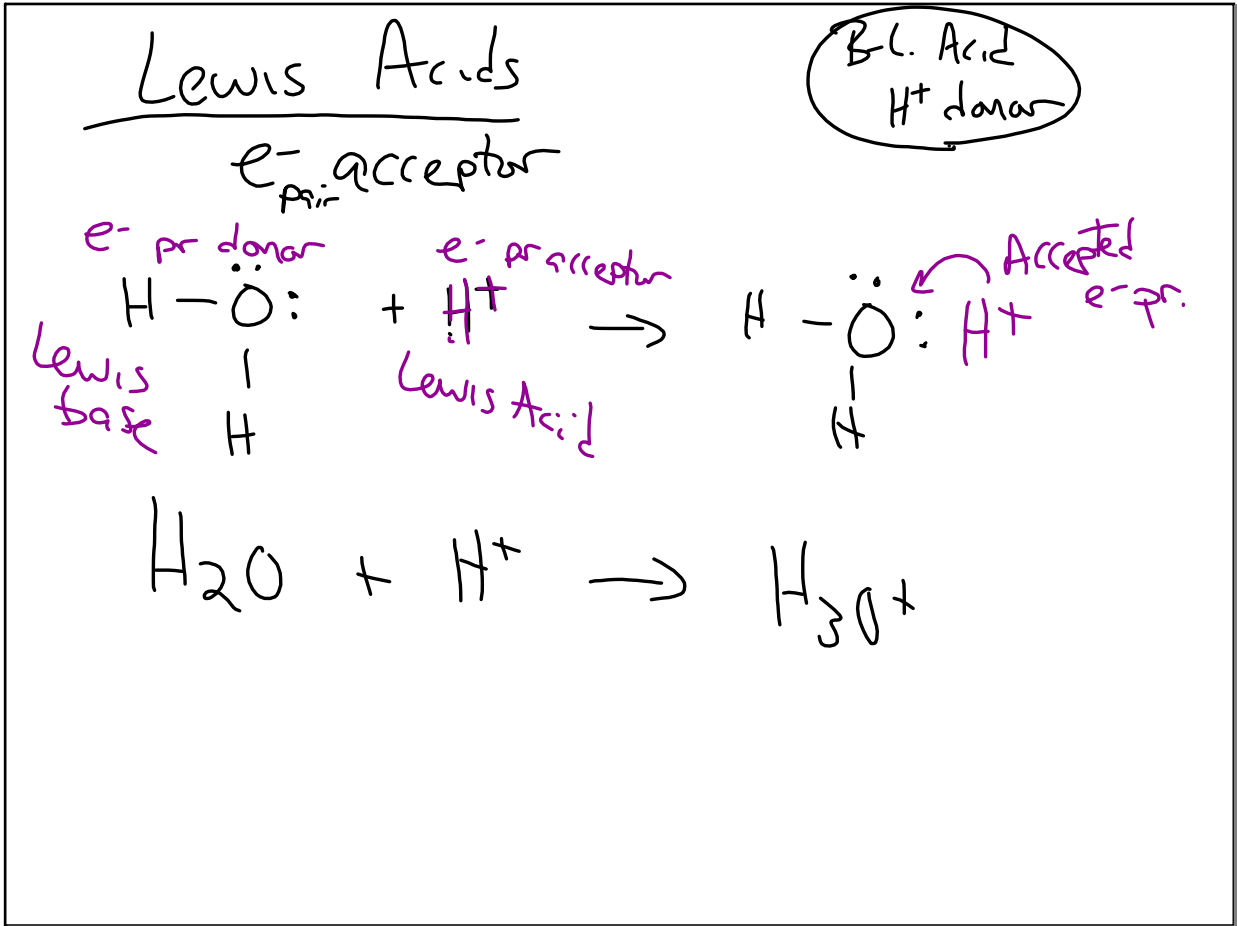
New H⁺ = 6.56 × 10⁻⁵ + 5.6 × 10⁻¹¹

$$[H^+] = 6.5574385243 \times 10^{-5} + 5.6 \times 10^{-11} = 6.5574385243 \times 10^{-5}$$

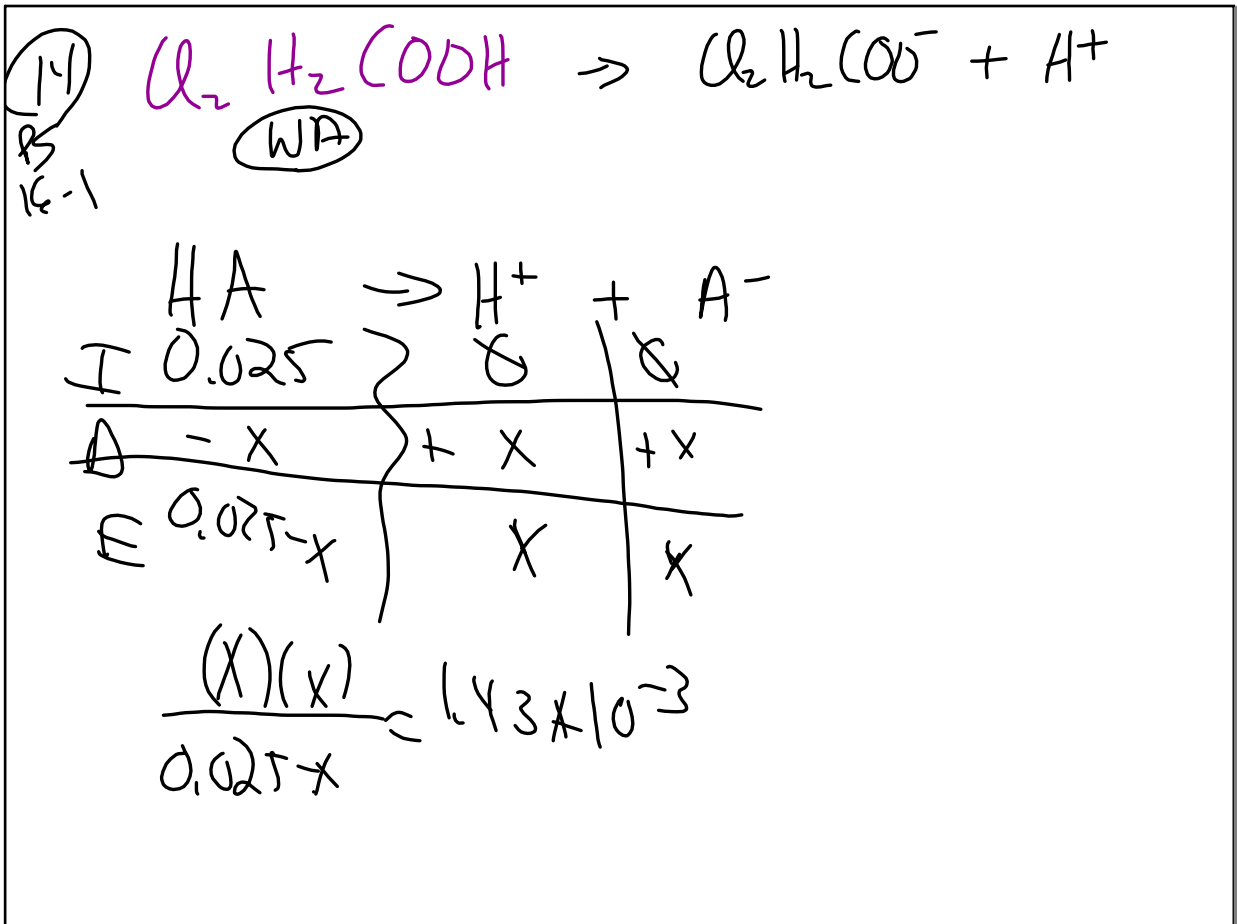
4.18326540133

2nd dissoc. took 7 decimal places to see a change.

Feb 23-8:49 AM



Feb 23-9:07 AM



Feb 23-9:13 AM

HW

PS 16-1

Feb 23-9:15 AM