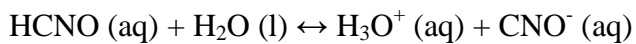


CHMG-142
In-class

Name(s): _____

Piece #1 Write the K_a reaction for HCNO



Piece #2 (1/2 pt) Write the equilibrium constant expression for the dissociation of HCNO

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{CNO}^-]}{[\text{HCNO}]}$$

Piece #3 Construct (don't solve) the ICE chart for the acid dissociation of 0.100 M HCNO.

	HCNO (aq) +	H ₂ O (l)	↔	H ₃ O ⁺ (aq)	+ CNO ⁻ (aq)
I	0.100 M	-		0	0
C	-x	-		+x	+x
E	0.100-x	-		x	x

Puzzle #1 – What is the pH of a 0.100 M HCNO solution?

	HCNO (aq) +	H ₂ O (l)	↔	H ₃ O ⁺ (aq)	+ CNO ⁻ (aq)
I	0.100 M	-		0	0
C	-x	-		+x	+x
E	0.100-x	-		x	x

$$K_a = \frac{[H_3O^+][CNO^-]}{[HCNO]} = 2 \times 10^{-4}$$

$$\frac{[x][x]}{[0.100 - x]} = 2 \times 10^{-4}$$

Assume $x \ll 0.100$

$$\frac{[x][x]}{[0.100]} = 2 \times 10^{-4}$$

$$x^2 = 2 \times 10^{-5}$$

$$x = 4.47 \times 10^{-3} M$$

Test the assumption

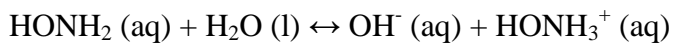
$$\frac{0.100}{20} = 0.005$$

$0.00447 < 0.005$, passes (barely)

	HCNO (aq) +	H ₂ O (l)	↔	H ₃ O ⁺ (aq)	+ CNO ⁻ (aq)
I	0.100 M	-		0	0
C	-0.00447	-		+0.00447	+0.00447
E	0.099553	-		0.00447	0.00447

$$pH = -\log(0.00447) = 2.35$$

Piece #1 Write the base dissociation reaction of HONH_2



Piece #2 Write the equilibrium constant expression for the base dissociation of HONH_2

$$K_b = \frac{[\text{OH}^-][\text{HONH}_3^+]}{[\text{HONH}_2]}$$

Piece #3 Construct (don't solve) the ICE chart for the acid dissociation of 0.250 M HONH_2 .

	$\text{HONH}_2 (\text{aq})$	$+$	$\text{H}_2\text{O} (\text{l})$	\leftrightarrow	$\text{OH}^- (\text{aq})$	$+$	$\text{HONH}_3^+ (\text{aq})$
I	0.250 M		-		0		0
C	-x		-		+x		+x
E	0.250-x		-		x		x

Puzzle #2 – What is the pH of 0.250 M HONH₂?

	HONH ₂ (aq) +	H ₂ O (l)	↔	OH ⁻ (aq)	+ HONH ₃ ⁺ (aq)
I	0.250 M	-		0	0
C	-x	-		+x	+x
E	0.250-x	-		x	x

$$K_b = \frac{[OH^-][HONH_3^+]}{[HONH_2]} = \frac{(x)(x)}{(0.250 - x)} = 1.1 \times 10^{-8}$$

Assume $x \ll 0.250$

$$\frac{(x)(x)}{(0.250)} = 1.1 \times 10^{-8}$$

$$x^2 = 2.5 \times 10^{-9}$$

$$x = 5 \times 10^{-5} M$$

	HONH ₂ (aq) +	H ₂ O (l)	↔	OH ⁻ (aq)	+ HONH ₃ ⁺ (aq)
I	0.250 M	-		0	0
C	$-5 \times 10^{-5} M$	-		$+5 \times 10^{-5} M$	$+5 \times 10^{-5} M$
E	0.250	-		$5 \times 10^{-5} M$	$5 \times 10^{-5} M$

Test assumption

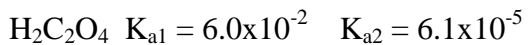
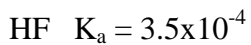
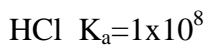
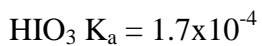
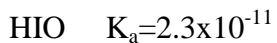
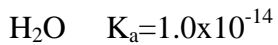
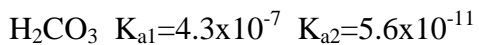
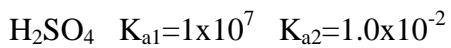
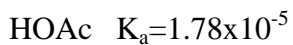
$$\frac{0.250}{20} = 0.0125$$

Good assumption

$$pOH = -\log(5 \times 10^{-5}) = 4.30$$

$$pH = 14 - pOH = 14 - 4.30 = 9.70$$

Dissociation constants of acids:



Dissociation constants of bases:

