(#8-5) Q: Can I determine the pH of a weak acid?

pH of weak vs. Strong

Ka: HF = 6.06E-4M HCN = 6.2E-10 HNO_3 = Extremely large HNO_2= 7.4 E-4

Write out the hydrolysis reaction and the equilibrium expression of the following acids.

1. 0.1M HF
2. 0.1M HCN
3. 0.1M HNO_2

$HF + H_2O \rightleftharpoons H_3O^+ + F^-$

$HCN + H_2O \rightleftharpoons H_3O^+ + CN^-$

$HNO_2 + H_2O \rightleftharpoons NO_2^- + H_3O^+$

4. Indicate the 6 strong acids: HCl, HBr, HI, HNO_3 H_2SO_4 $HClO_4$
5. What two factors will ultimately determine the $[H_3O^+]$
   - Concentration
   - Strength

Determine the Hydrolysis equation, $[H_3O^+]$, and the pH of the following acids.

	Hydrolysis reaction	$[H_3O^+]$	pH	
6. 0.1M HCl	$HCl + H_2O \rightarrow H_3O^+ + Cl^-$	0.1	1	$-\log(.1) = 1$
7. 0.01M HBr	$HBr + H_2O \rightarrow H_3O^+ + Br^-$	.01	2	$-\log(.01) = 2$
8. 0.015M HNO_3	$HNO_3 + H_2O \rightarrow NO_3^- + H_2O$	0.015	1.8	$-\log(.015) = 1.8$
9. 0.001M $HClO_4$	$HClO_4 + H_2O \rightarrow ClO_4^- + H_2O$	0.001	3	
10. 1.5M HI	$HI + H_2O \rightarrow H_3O^+ + I^-$	1.5M	-.17	$-\log(1.5) = -.17$

11. Why don't you need a K value to determine the pH of the previous acids?

↳ is strength. these are all strong 100% ionization

Determine the $[H_3O^+]$ and the pH of the acids listed in questions **1-6 acids**. (Create an ISE table for each)

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(12-15)

#1

$HF + H_2O \rightleftharpoons H_3O^+ + F^-$

I	.1	0	0
S	-x	+x	+x
E	.1-x	x	x

$6.06E\text{-}4 = \frac{x^2}{.1}$

$x = \sqrt{6.06E\text{-}5}$

$x = 0.0077$

$-\log(0.0077) = 2.1$

#2

$HCN + H_2O \rightarrow H_3O^+ + CN^-$

I	0.1	0	0
S	-x	+x	+x
E	.1-x	x	x

$6.2E\text{-}10 = \frac{x^2}{.1}$

$x = 7.8E\text{-}6$

$-\log(\ ) = 5.1$

#3 $HNO_2 + H_2O \rightleftharpoons H_3O^+ + NO_2^-$

I	.1	0	0
S	-x	+x	+x
E	.1-x	x	x

$7.4E\text{-}4 = \frac{x^2}{.1}$

$x = \sqrt{7.4E\text{-}5}$

$x = 0.0086$

$-\log(\ ) = 2.06$