

**Part A: Into to Acids and Bases**

1) Match the following acid-base definitions with their correct name:

<b>Name</b>	<b>Definition</b>
• Arrhenius acid	• A substance that produces OH <sup>-</sup> ions in aqueous solution
• Arrhenius base	• A proton (H <sup>+</sup> ion) acceptor
• Brønsted-Lowery acid	• A substance the produces H <sup>+</sup> ions in aqueous solution
• Brønsted-Lowery base	• A proton (H <sup>+</sup> ) donor

2) Identify which are strong acids and which are weak acids. Hint if you know the 6 strong acids (in addition to HClO<sub>3</sub>) from your text book then you can identify those that are weak.

<b>List as SA or WA</b>	
• HCN	• H <sub>2</sub> SO <sub>4</sub>
• HClO	• HNO <sub>2</sub>
• HCHO <sub>2</sub>	• H <sub>3</sub> PO <sub>4</sub>
• HClO <sub>4</sub>	• HC <sub>7</sub> H <sub>5</sub> O <sub>2</sub>

What does acid strength have to do with the bonding?

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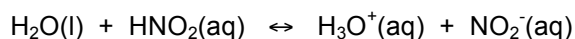
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And which of the above are polyprotic?

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3) Consider the ionization reaction between a weak acid and water shown below. Identify the conjugate acid and base.



**Part B: Acid ionization constant,  $K_a$**

- 4) Complete the weak acid table below by filling in each row with any missing formulas, ionization reactions, or acid ionization constants,  $K_a$ .

Formula	Ionization reaction	$K_a$ expression	$pK_a$
		$K_a = \frac{[H_3O^+][NO_2^-]}{[HNO_2]}$	3.34
HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>			4.74
	HClO(aq) + H <sub>2</sub> O(l) $\leftrightarrow$ H <sub>3</sub> O <sup>+</sup> (aq) + ClO <sup>-</sup> (aq)		7.54

All of the above are weak acids, assuming 1.0M solutions of all, use the  $pK_a$  values to identify the weakest of the series.

**Part C: pH and pOH**

- 5) Answer the following questions concerning a solution that has an  $[OH^-] = 2.5 \times 10^{-9}$  M. (Be sure your answers have correct significant figures.)

a) What is the pOH of the solution?	c) What is the pH of the solution?
b) What is the $[OH^-]$ of the solution?	d) What is the $[H_3O^+]$ of the solution?

**Part D: pH of Strong Acid and Weak Acid Solutions**

- 6) What is the pH of a 0.55 M nitric acid solution? (Be sure your answers have correct significant figures.)
- 7) What is the pH of a 0.55 M hypochlorous solution. (Be sure your answers have correct significant figures.)
- 8) What is the  $K_a$  for the unknown monoprotic acid, HA, if the pH of the solution is 4.50?