CONCEPT: TITRATIONS: WEAK ACID-	STRONG BASE
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This type of titration has the	as the titrate and the	as the titrant.		
□ When a weak species reacts v	with a strong species use an ICF (I	, C	, F) Chart.
□ The ICF Chart is used to calcu	ulate the amounts of com	pounds.		
☐ The units of an ICF Chart will be	pe in			
Before the Equivalence Point				
In this part of the titration, the moles of	weak acid is the mole	s of strong b	ase.	
☐ As the Strong Base neutralizes	s the Weak Acid, some <u>Conjugate Base</u>	is formed.		
EXAMPLE: Consider the titration of 75. Calculate the pH.	.0 mL of 0.0300 M HC ₃ H ₃ O ₃ (K _a = 4.1 X	(10 ⁻³) with 12	2.0 mL of 0.04	450 M KOH.
STEP 1: Setup an ICF Chart with the stro	ong species set as a react with its chemical			
ICF O	Chart (Weak Acid-Strong E	Base)		
(aq) + 	(aq) () +	_()		
STED 2: Heing the INITIAL DOW place	the given amounts in			
STEP 2: Using the INITIAL ROW, place to			Q	
□ III all IOF Chait we only cale a	about the,		, α	,
STEP 3: Using the CHANGE ROW, look	ing at the reactants subtract from their in of Mass, whatever you lose as a react			
STEP 4: The Henderson-Hasselbalch Eq	quation is used for a to find	the pH of a s	solution.	
	ne moles of the and	·		
		1:		
Hen	derson-Hasselbalch Equa	ation		
$pH = pKa + log \frac{[CB]}{[WA]}$	$pH = pKb + log \frac{[CA]}{[WB]}$			

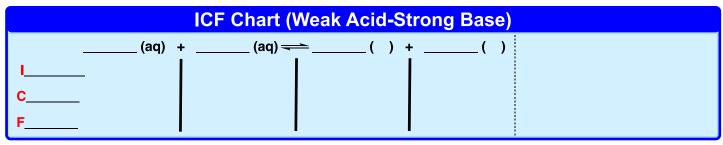
PRACTICE: In order to create a buffer 7.510 g of sodium cyanide is mixed with 100.0 mL of 0.250 M hydrocyanic acid, HCN. What is the pH of the buffer solution after the addition of 12.0 mL of 0.300 M NaH? $K_a = 4.9 \times 10^{-10}$.

At the Equivalence Point

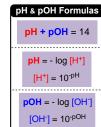
- In this part of the titration the moles of weak acid is _____ the moles of strong base.
 - □ The weak acid and strong base have been _____ and only the conjugate base remains.

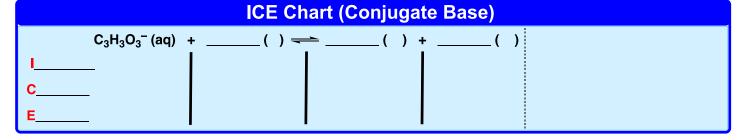
EXAMPLE: Consider the titration of 75.0 mL of 0.0300 M HC₃H₃O₃ ($K_a = 4.1 \times 10^{-3}$) with 50.0 mL of 0.0450 M KOH. Calculate the pH.

Use STEPS 1 to 3 to setup the ICF Chart.

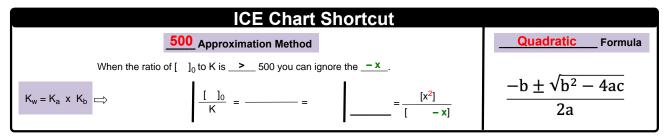


- **STEP 4:** Using the **FINAL ROW**, determine the concentration of the conjugate base.
 - □ Divide its final _____ at by the total volume used in the chemical reaction.
- STEP 5: Setup an ICE Chart for the conjugate base that has it reacting with ______.
 - □ For **lonic Bases**, _____ the neutral metal cation.





- STEP 6: Using the EQUILIBRIUM ROW, setup the equilibrium constant expression with _____ and solve for ____.
 - □ Check if a shortcut can be utilized to avoid the _____ formula.



STEP 7: The _____ variable will equal [__] and can be used to solve pOH.

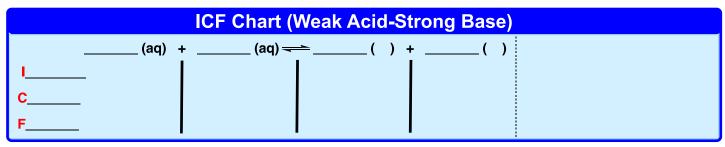
PRACTICE: Consider the titration of 75.0 mL of 0.60 M HNO₂ with 0.100 M NaOH at the equivalence point. What would be the pH of the solution at the equivalence point? The K_a of HNO₂ is 4.6 x 10⁻⁴.

After the Equivalence Point

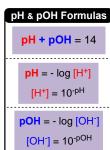
- In this part of the titration the moles of weak acid is _____ the moles of strong base.
 - □ There will be _____ strong base remaining after it has neutralized the weak acid.

EXAMPLE: Consider the titration of 75.0 mL of 0.0300 M HC₃H₃O₃ ($K_a = 4.1 \text{ X } 10^{-3}$) with 75.0 mL of 0.0450 M KOH. Calculate the pH.

Use STEPS 1 to 3 to setup the ICF Chart.



- **STEP 4:** Using the **FINAL ROW**, determine the concentration of the strong base.
 - □ Divide its final _____ by the total volume used in the chemical reaction.
- **STEP 5:** Recall, the concentration of the strong base will be equal to _____.



PRACTICE: Calculate the pH of the solution resulting from the mixing of 55.0 mL of 0.100 M NaCN and 75.0 mL of 0.100 M HCN with 0.0090 moles of NaOH.