* Equivalence point for Weak Acids + Strong Bases

means mols of added base = initial mols of acid

50 mL
0.100 M

HCH_3COO + OH^- $\rightleftharpoons$ CH_3COO^- + H_2O

50 mL
0.100 M

0.0050 mol — 0.0050 mol — 0 — —

− 0.005 mol — − 0.0050 mol — + 0.0050

---

0 — 0 — 0.0050 mol

Remember that is a weak base!

can perform rxn

CH_3COO^- + H_2O $\rightleftharpoons$ HCH_3COO + OH

0.0050 mol — 0 — 0

− X — + X — + X

0.0050 − X — X — X

Now we just set up simple equilibrium equation for weak base in order to find $x = [OH^-]$

↳ note that now we need K_b

$$K_b = \frac{1.0 \times 10^{-14}}{1.8 \times 10^{-5}} = 5.5 \times 10^{-10}$$

(1.8×10^{-5} → K_a of HCH_3COO)

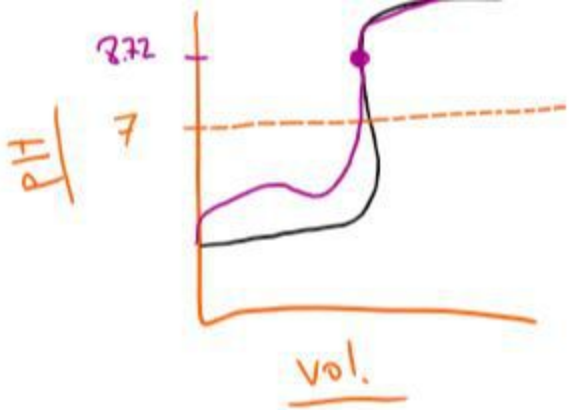
$$K_b = \frac{x^2}{.205 - x} = \frac{x^2}{0.005} = 5.5 \times 10^{-10}$$

$$x = 5.25 \times 10^{-6} = [OH^-]$$

$$pOH = 5.28$$

$$pH = 14 - 5.28 = 8.72$$

* At equivalence point for Weak Acid + Strong Base titration, the end soln is basic



51 mL of NaOH

HCH_3CO	+ OH	$\rightleftharpoons$ CH_3CO^-	+ H_2O
0.0050	0.0051	0	
−0.0050	−0.0050	+0.0050	
0	0.0001	0.0050	

$$pOH = -\log[OH^-] = -\log\left(\frac{0.0001\ mol}{0.101\ L}\right)$$

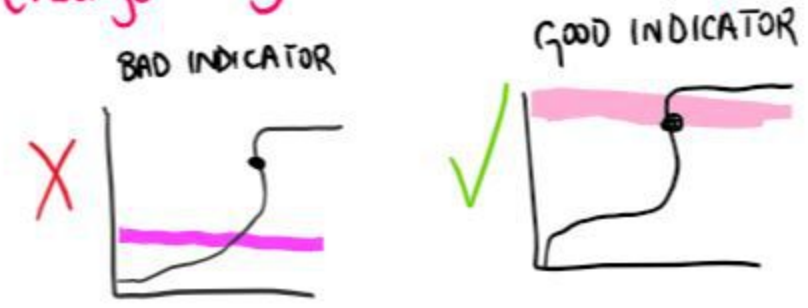
↳ total volume of soln

$$= 2.32$$

$$pH = 14 - 2.32 = \boxed{11.68}$$

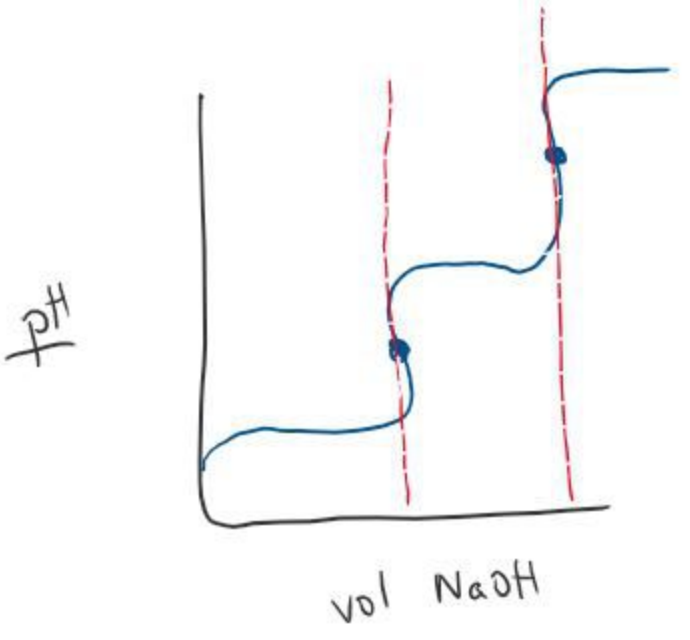
- The buffer region for Weak Acid + Strong Base titration is before the equivalence point
  - ↳ as an acid gets weaker, its initial pH is higher
  - ↳ halfway to equivalence point, $pH = pK_a$

- Each indicator has its own pH range over which it changes colour
  - ↳ a good indicator changes colour in the small volume change region where the pH changes rapidly



Titration of Polyprotic Acid

↳ polyprotic Acid has multiple equivalence points
- one for each proton



↳ also @ halfway to equivalence point,

$pH = pK_a$

Solubility

March 22, 2019 10:46 AM

- gives us guidelines of how much certain things dissolve
  - ↳ how much remains solid vs. how much dissolves
- This question has something to do w equilibrium

$NaCl\,(\text{strong electrolyte}) \rightleftharpoons Na^+(aq) + Cl^-(aq)$

$CaCO_3(s)\,(\text{strong electrolyte}) \rightleftharpoons Ca^{2+}(aq) + CO_2^{2-}(aq)$

SOLUBILITY EQUILIBRIUM

$$K_{sp} = [Na^+][Cl^-]$$

↳ only ions appear

↳ an equilibrium constant that describes the formation of a saturated soln of a slightly soluable salt

↑ K_{sp} = very soluable