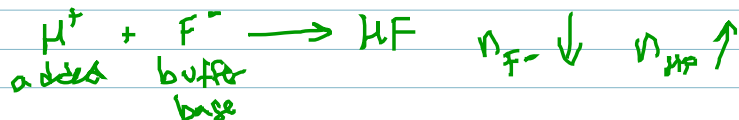


What is the pH of a solution made by mixing 500 mL of 1.00 M HF with 500 mL of 1.00 M NaF?

$$\text{pH} = \text{p}K_a + \log \frac{[\text{F}^-]}{[\text{HF}]} = 3.15$$

What is the new pH of the solution if 0.100 mol of HCl is added (without changing the volume)



$$\text{F}^- : (1.00\text{M})(0.500\text{L}) = 0.500\text{mol} - 0.100\text{mol} = \frac{0.400\text{mol}}{1\text{L}} = [\text{F}^-] \rightarrow 0.400\text{M}$$

$$\text{HF} : (1.00\text{M})(0.500\text{L}) = 0.500\text{mol} + 0.100\text{mol} = \frac{0.600\text{mol}}{1\text{L}} = [\text{HF}] = 0.600\text{M}$$

$$\text{pH} = 3.15 + \log \frac{0.400}{0.600} = 2.97$$

buffer: 3.15 \rightarrow 2.97

pure H₂O: 7.00 \rightarrow 1.00

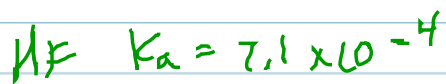
How could I make a buffer with pH = 5.00 using CH₃COOH ($K_a = 1.8 \times 10^{-5}$)

$$5.00 = 4.74 + \log \frac{[\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]}$$

$$0.26 = \log \frac{[\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]}$$

$$10^{0.26} = \frac{[\text{CH}_3\text{COO}^-]}{[\text{CH}_3\text{COOH}]} = \frac{1.82}{1}$$

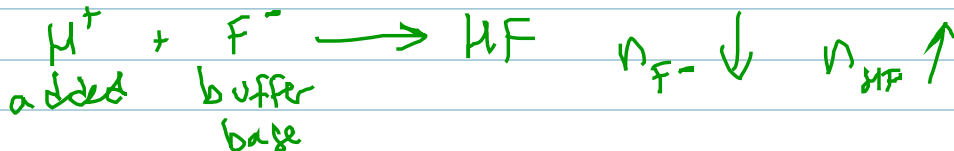
500 mL of 0.182 M CH₃COO⁻
500 mL of 0.100 M CH₃COOH



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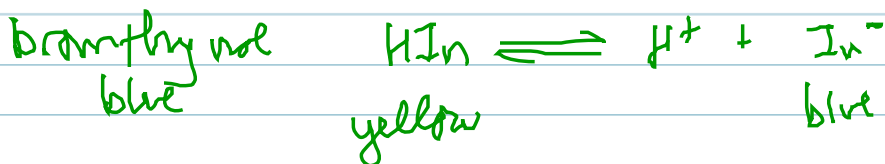
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ACID-BASE INDICATORS

- chemicals that change color depending on the pH of the solution
- END POINT \Rightarrow COLOR CHANGE

CHOOSE an indicator END POINT \approx EQ POINT

often a weak acid itself



$$\frac{[\text{blue}]}{[\text{yellow}]} \geq 10 \Rightarrow \text{looks blue}$$
$$\frac{[\text{blue}]}{[\text{yellow}]} \leq 0.1 \Rightarrow \text{looks yellow}$$
$$\frac{[\text{blue}]}{[\text{yellow}]} \text{ between } 0.1 \text{ and } 10 \Rightarrow \text{looks greenish}$$