

Ionization Problems

P. 595 #15



I	0.22	}		0	0
C	x	}		x	x
E	$0.22 - x$			x	x

$$6.5 \times 10^{-5} = \frac{x^2}{0.22 - x}$$

$$(6.5 \times 10^{-5})(0.22) = x^2$$

$$\sqrt{1.43 \times 10^{-5}} = \sqrt{x^2}$$

$$3.78 \times 10^{-3} = x = [\text{OH}^-]$$

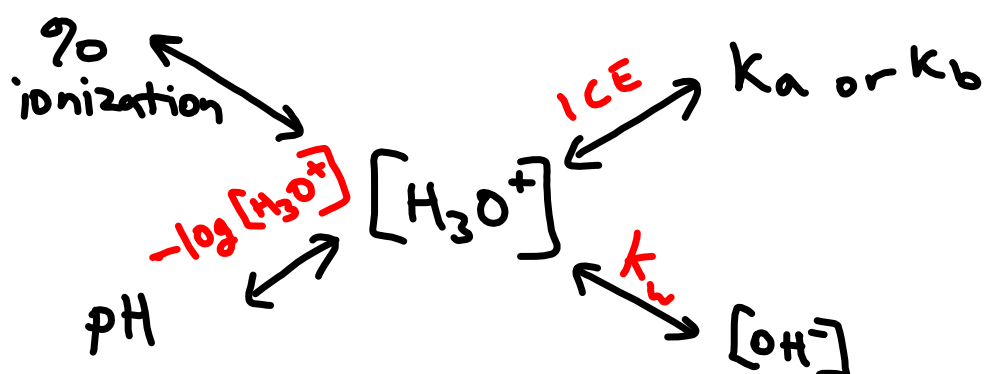
% Ionization

$$\% = \frac{[\text{OH}^-]}{[(\text{CH}_3)_3\text{N}]} \times 100\%$$

$$= \frac{3.78 \times 10^{-3}}{0.22} \times 100\%$$

$$= 1.72\%$$

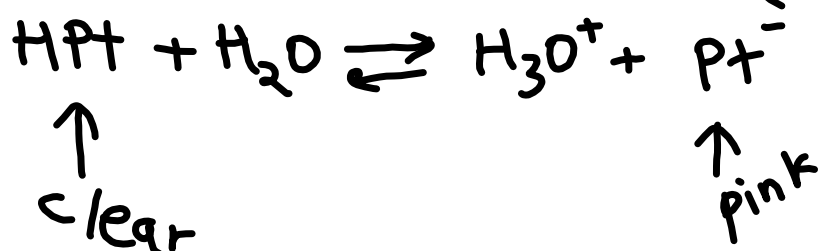
Acid-Base Problems Map



Acid-Base Indicators

- Change colour when changing pH.
- Indicators are themselves weak acids.

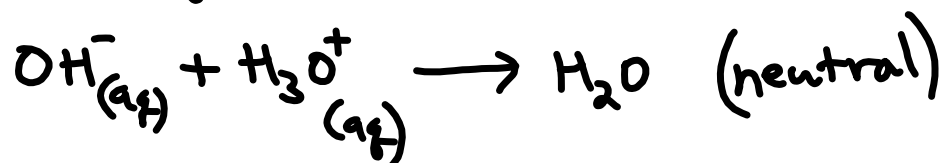
example - phenolphthalein (HPT)



i) If HPT in acidic solution

- Stress \uparrow $[\text{H}_3\text{O}^+]$
- Shift reactants
- more HPT (clear)
- less PT^- (pink)

ii) If using basic solution (OH^-)



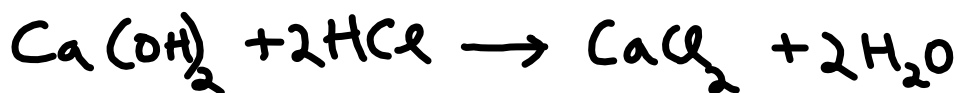
Stress - \downarrow $[\text{H}_3\text{O}^+]$

Shift - products

Consequence - more PT^- (pink)
- less HPT (clear)

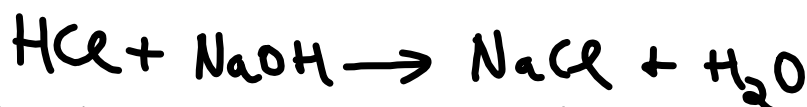
Neutralization Reactions

Stomach-



P.599 Base + Acid \rightarrow Salt + water

Example - A 14.8 mL sample of HCl is titrated with 8.5 mL of 0.50 mol/L NaOH. Find [HCl]



$$\text{i) Moles NaOH} = \frac{0.50 \text{ mol NaOH}}{1 \text{ L NaOH}} \times 0.0085 \text{ L}$$

$$\begin{aligned} &= 0.00425 \text{ mol NaOH} \\ \text{ii) Moles HCl} &= 0.00425 \text{ mol NaOH} \times \frac{1 \text{ mol HCl}}{1 \text{ mol NaOH}} \\ &= 0.00425 \text{ mol HCl} \end{aligned}$$

$$\begin{aligned} \text{iii) } [\text{HCl}] &= \frac{0.00425 \text{ mol HCl}}{0.0148 \text{ L HCl}} \\ &= 0.287 \text{ mol/L HCl} \end{aligned}$$

P.602
text
#17-20

Acid-Base Titration