Ka problems....

Worksheet-

9. $[H_3O^+] = 4.0 \times 10^{-2}$

$[HF] = 2.5\ mol/L$

$\% \text{ ioniz.} = \frac{4.0 \times 10^{-2}}{2.5} \times 100\%$

10. $0.020\ mol/L\ H_2SO_4 \rightarrow 2H^+ + SO_4^{2-}$

$[H_3O^+] = 0.020 \times 2 = 0.040\ mol/L$

2. $HX + H_2O \rightleftharpoons H_3O^+ + X^-$

I	1.0		0	0
C	6.3×10^{-6}		6.3×10^{-6}	6.3×10^{-6}
E	1.0		6.3×10^{-6}	6.3×10^{-6}

pH = 5.2 $[H_3O^+] = 6.3 \times 10^{-6}$

$K_a = \frac{(6.3 \times 10^{-6})(6.3 \times 10^{-6})}{1.0}$

$= 4.0 \times 10^{-11}$

Acid-Base Indicators

Indicators are, themselves, weak acids. They have different colours for acid or base form.

e.g. Phenolphthalien- (HPt)

$HPt + H_2O \rightleftharpoons H_3O^+ + Pt^-$

↑ clear ↑ pink

i) If HPt is in acidic sol'n,
- stress $[H_3O^+]\uparrow$
- Shift to reactants
- Consequence - more HPt (clear)
  - less Pt^- (pink)

ii) If a basic solution is used,

$OH^- + H_3O^+ \rightarrow 2H_2O$ (neutral)

Stress $\downarrow [H_3O^+]$

Shift to products

Consequences- $[HPt]\downarrow$ (clear) $[Pt^-]\uparrow$ (pink)

Neutralization Reactions

Recall ksp lab-

$Ca(OH)_2 + 2HCl \rightarrow CaCl_2 + 2H_2O$

base acid salt water

e.g. Titration (p.599)

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

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

$= 0.00425\ mol\ NaOH$

$HCl + NaOH \rightarrow NaCl + H_2O$

ii) moles HCl

$0.00425\ mol\ NaOH \times \frac{1\ mol\ HCl}{1\ mol\ NaOH} = 0.00425\ mol\ HCl$

iii $[HCl] = \frac{0.00425\ mol\ HCl}{0.0148\ L\ NaOH} = 0.287\ mol/L$

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