

$\therefore [\text{H}^+] = 1.0 \text{ M}$ ✓

$\text{pH} = -\log [\text{H}^+]$ ✓

$\text{pH} = -\log 1.0$

$\text{pH} = 0$ ✓

$K_w = [\text{H}^+][\text{OH}^-]$ ✓

$[\text{OH}^-] = \frac{K_w}{[\text{H}^+]}$

$[\text{OH}^-] = \frac{1 \times 10^{-14}}{1.0}$

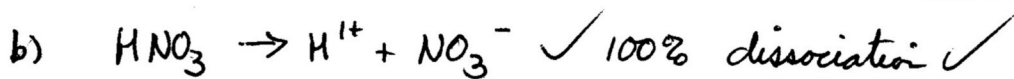
$[\text{OH}^-] = 1 \times 10^{-14}$ ✓

$\text{pH} + \text{pOH} = 14$ ✓

$\text{pOH} = 14 - \text{pH}$

$\text{pOH} = 14 - 0$

$\text{pOH} = 14$ ✓



$\therefore [\text{H}^+] = 0.5 \text{ M}$ ✓

$\text{pH} = -\log [\text{H}^+]$ ✓

$\text{pH} = 0.30103$ ✓

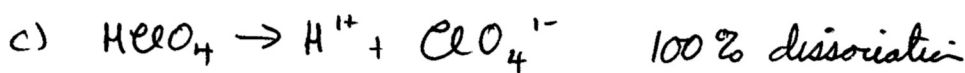
$[\text{OH}^-] = \frac{K_w}{[\text{H}^+]}$ ✓

$[\text{OH}^-] = 2 \times 10^{-14}$ ✓

$\text{pOH} = -\log [\text{OH}^-]$ ✓

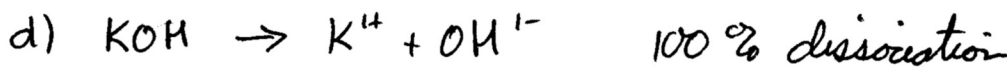
$\text{pOH} = 13.699$ ✓

this is sufficient



$\therefore [\text{H}^+] = 0.002 \text{ M}$

etc. etc. etc.



$[\text{OH}^-] = 1.5 \times 10^{-4} \text{ M}$

$\text{pOH} = -\log [\text{OH}^-]$

$\text{pOH} = 3.82$

$[\text{H}^+] = \frac{K_w}{[\text{OH}^-]}$

$[\text{H}^+] = 6.67 \times 10^{-11}$

$\text{pH} = 14 - \text{pOH}$

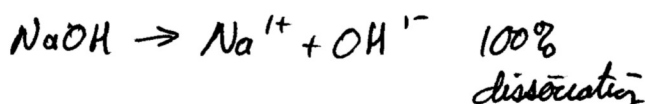
$\text{pH} = 10.18$

e) $0.040 \text{ g} \times \frac{1 \text{ mol}}{40.00 \text{ g}} = 0.001 \text{ mol}$

$C = \frac{n}{V}$

$C = \frac{0.001 \text{ mol}}{2.0 \text{ L}}$

$C = 0.0005 \text{ M}$



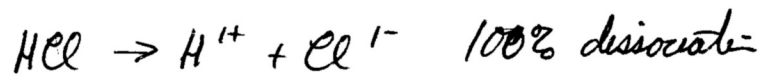
$\therefore [\text{OH}^-] = 0.0005 \text{ M}$

etc. etc. etc.

$$f) C_1 V_1 = C_2 V_2$$

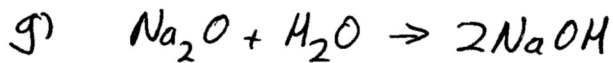
$$1.0 \text{ mL} \times 0.20 \text{ M} = C_2 \times 5000 \text{ mL}$$

$$C_2 = 0.00004 \text{ M}$$



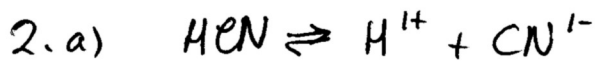
$$\therefore [\text{H}^+] = 0.00004 \text{ M}$$

etc. etc



$$\frac{0.10 \text{ mol Na}_2\text{O}}{1.0 \text{ L}} \times \frac{2 \text{ mol NaOH}}{1 \text{ mol Na}_2\text{O}} \times \frac{1 \text{ mol OH}^-}{1 \text{ mol NaOH}} = \frac{0.20 \text{ mol OH}^-}{1 \text{ L}}$$

$$\therefore [\text{OH}^-] = 0.20 \text{ M} \quad \text{etc. etc}$$



$$[\text{CN}^-] = [\text{H}^+]$$

$$[\text{HCN}] = 1.0 - [\text{H}^+]$$

$$K_A = \frac{[\text{H}^+][\text{CN}^-]}{[\text{HCN}]}$$

$$3.0 \times 10^{-8} = \frac{[\text{H}^+]^2}{1.0 - [\text{H}^+]}$$

$$[\text{H}^+] = \sqrt{4 \times 10^{-10} (1.0 - [\text{H}^+])}$$

}

$$[\text{H}^+] = 2.00 \times 10^{-5} \text{ M}$$

$$\text{pH} = -\log [\text{H}^+]$$

$$\text{pH} = 4.699$$

$$\% \text{ dissociation} = \frac{[\text{H}^+]}{C_A^0} \times 100\%$$

$$\% \text{ dis} = \frac{2.00 \times 10^{-5} \text{ M}}{1.0 \text{ M}} \times 100\% = 0.00200 \text{ M}$$

← Note C_A^0 is the symbol for initial acid []

$$b) [H^+] = 6.32 \times 10^{-7} M$$

$$pH = 6.20$$

$$\% \text{ dis} = 0.0632\%$$

$$c) [H^+] = 0.0261 M$$

$$pH = 1.584$$

$$\% \text{ dis} = 2.61\%$$

$$d) [H^+] = 0.0160 M$$

$$pH = 1.797$$

$$\% \text{ dis} = 3.19\%$$

$$e) [H^+] = 0.01 M$$

$$pH = 2$$

$$\% \text{ dis} = 2.00\%$$

$$g) [H^+] = 1.70 \times 10^{-5} M$$

$$pH = 4.77$$

$$\% \text{ dis} = 0.00341\%$$

$$3. \quad HF \rightleftharpoons H^+ + F^-$$

$$[H^+] = 10^{-pH}$$

$$= 10^{-2.2}$$

$$= 0.00631 M$$

$$[F^-] = [H^+]$$

$$= 0.00631 M$$

$$[HF] = 0.1 - 0.00631$$

$$= 0.0936 M$$

$$\frac{2.0 \text{ g HF}}{1.0 \text{ L}} \times \frac{1 \text{ mol}}{20.01 \text{ g HF}} = \frac{0.1 \text{ mol}}{1 \text{ L}}$$

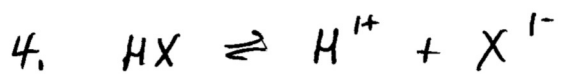
$$\therefore C_A^0 = 0.1 M$$

$$K_A = \frac{[H^+][F^-]}{[HF]}$$

$$K_A = \frac{(0.00631)(0.00631)}{0.0936}$$

$$K_A = 4.251 \times 10^{-4}$$

From the list the acid is likely nitrous acid (not a good match)



$$\begin{aligned} [\text{H}^+] &= 0.06 \times C_A^0 \\ &= 0.06 \times 0.1 \text{ M} \\ &= 0.006 \text{ M} \end{aligned}$$

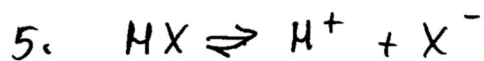
$$\begin{aligned} [\text{X}^-] &= [\text{H}^+] \\ &= 0.006 \text{ M} \end{aligned}$$

$$\begin{aligned} [\text{HX}] &= C_A^0 - [\text{H}^+] \\ &= 0.1 - 0.006 \\ &= 0.094 \end{aligned}$$

$$K_A = \frac{[\text{H}^+][\text{X}^-]}{[\text{HX}]}$$

$$K_A = \frac{(0.006)^2}{0.094}$$

$$K_A = 3.83 \times 10^{-4}$$



$$\begin{aligned} [\text{H}^+] &= 0.20 \times C_A^0 \\ &= 0.20 \times 1 \times 10^{-3} \\ &= 2 \times 10^{-4} \end{aligned}$$

$$\begin{aligned} \cancel{[\text{X}^-]} &= \cancel{[\text{H}^+]} \\ &= \cancel{2 \times 10^{-4}} \end{aligned}$$

$$\begin{aligned} \text{pH} &= -\log[\text{H}^+] \\ &= 3.699 \end{aligned}$$

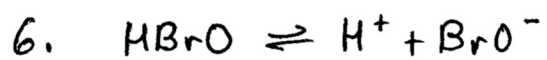
$$\begin{aligned} [\text{X}^-] &= [\text{H}^+] \\ &= 2 \times 10^{-4} \end{aligned}$$

$$\begin{aligned} [\text{HX}] &= C_A^0 - [\text{H}^+] \\ &= 1 \times 10^{-3} - 2 \times 10^{-4} \\ &= 8 \times 10^{-4} \end{aligned}$$

$$K_A = \frac{[\text{H}^+][\text{X}^-]}{[\text{HX}]}$$

$$K_A = \frac{(2 \times 10^{-4})^2}{8 \times 10^{-4}}$$

$$K_A = 5 \times 10^{-5}$$



$$[\text{H}^+] = 10^{-\text{pH}}$$

$$= 10^{-4.8}$$

$$= 1.585 \times 10^{-5}$$

$$[\text{BrO}^-] = [\text{H}^+]$$

$$= 1.585 \times 10^{-5}$$

$$[\text{HBrO}] = C_A^0 - [\text{H}^+]$$

$$= C_A^0 - 1.585 \times 10^{-5}$$

$$\rightarrow K_A = \frac{[\text{H}^+][\text{BrO}^-]}{[\text{HBrO}]}$$

$$2.0 \times 10^{-9} = \frac{(1.585 \times 10^{-5})^2}{C_A^0 - 1.585 \times 10^{-5}}$$

$$C_A^0 = 0.12561 \text{ M}$$