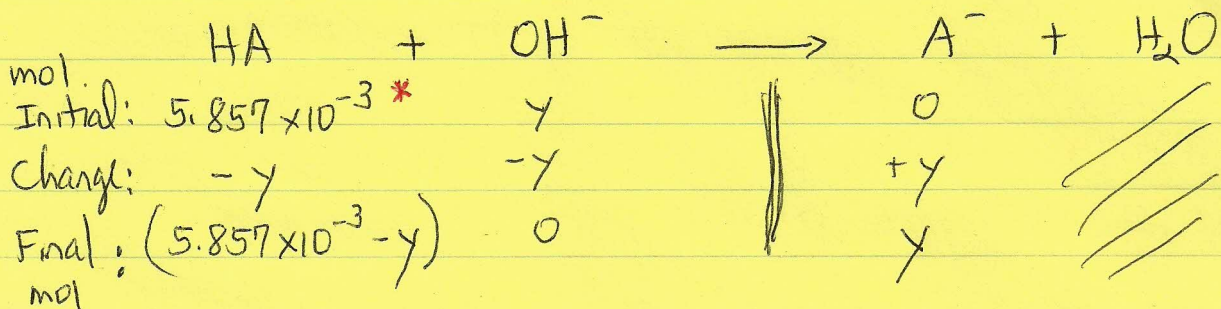


10-10. Calc. conc. of NaOH, $V_{OH} = 22.63 \text{ mL}$, added to 1.214 g HA (MM 207.29) dissolved in 41.37 mL H_2O . Solution pH = 9.24. Use Table 8-2 to find K_a of HA

$$pK_a(\text{HA}) = 9.39$$

Work: It does not say equivalence point, so we assume we are still in the buffer region (i.e. before eq. pt.)



$$* \text{Initial mol HA} = \frac{1.214 \text{ g}}{207.29 \text{ g/mol}} = 5.857 \times 10^{-3}$$

Buffer:
$$pH = pK_a + \log\left(\frac{\text{mol } A^-}{\text{mol HA}}\right)$$

$$9.24 = 9.39 + \log\left(\frac{y}{5.857 \times 10^{-3} - y}\right)$$

$$10^{(9.24 - 9.39)} = \frac{y}{5.857 \times 10^{-3} - y} \Rightarrow (0.7079)(5.857 \times 10^{-3}) = y + 0.7079y$$

Solving for y gives $y = 2.428 \times 10^{-3} \text{ mol } A^-$

$$[OH^-] = \frac{2.428 \times 10^{-3} \text{ mol } OH^-}{0.02263 \text{ L}} \Rightarrow [OH^-] = 0.107 \frac{\text{mol}}{\text{L}}$$

\nwarrow V_{NaOH}