Chapter 16

#75) [OH] given a .075 M solution & a $K_b = 6.4 \times 10^{-4}$

- Set up problem as usual.

$$6.4 \times 10^{-4} = \frac{x^2}{.075} \quad \text{Solve for } x.$$

$$x = \sqrt{(.075)(6.4 \times 10^{-4})} = 6.9 \times 10^{-3} = [OH]$$

plug into pOH + subtract from 14.

$$pH = 14 - (-\log 6.9 \times 10^{-3}) = 11.84$$

Check for accuracy of our assumption.

$$\frac{6.9 \times 10^{-3}}{.075} \times 100 = 9.2\%$$

← too large so we have to use quadric formula.

$$6.4 \times 10^{-4} = \frac{x^2}{.075 - x} \rightarrow x^2 + 6.4 \times 10^{-4}x - 4.8 \times 10^{-5} = 0$$

(A → x^2, B → 6.4×10^{-4}, C → 4.8×10^{-5})

use quadric formula to solve this equation.

$$x = \frac{b \pm \sqrt{b^2 - 4ac}}{2a} \Rightarrow$$

$$x = \frac{6.4 \times 10^{-4} \pm \sqrt{(6.4 \times 10^{-4})^2 - 4(1)(4.8 \times 10^{-5})}}{2(1)} = 6.6 \times 10^{-3} = [OH]$$

$$pH = 14 - (-\log 6.6 \times 10^{-3}) = 11.82$$

What a waste of time for 2/100 difference.