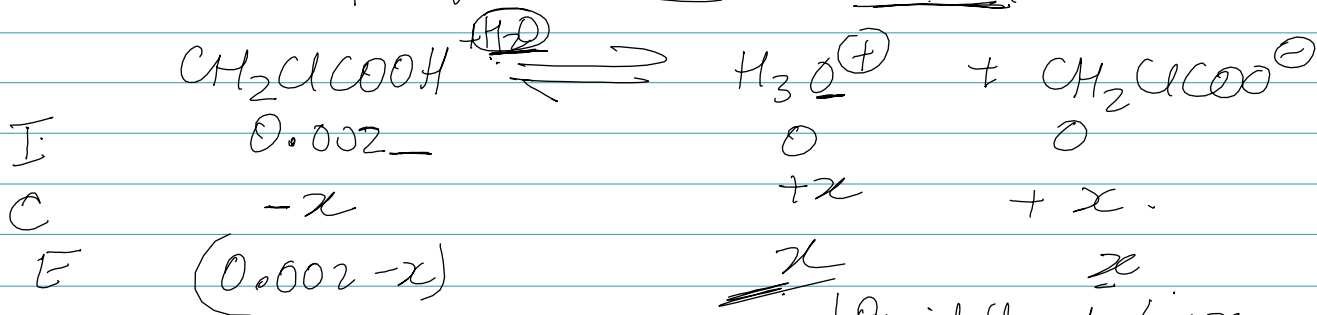


Sayin Gupta

Acid-base (2) Calculating pH of Acids (2)

What is the pH of 0.00200M CH_2ClCOOH ? $K_a = 1.4 \times 10^{-3}$



$$K_a = 1.4 \times 10^{-3} = \frac{(x)(x)}{(0.002-x)}$$

Quick check for x .

$$\frac{0.002}{1.4 \times 10^{-3}} = 1.4 < 100$$

cannot ignore x

$$1.4 \times 10^{-3} = \frac{x^2}{(0.002-x)}$$

$$(1.4 \times 10^{-3})(0.002-x) = x^2$$

$$\frac{1}{a} x^2 + \frac{1.4 \times 10^{-3}}{b} x - \frac{2.8 \times 10^{-6}}{c} = 0$$

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

$$= \frac{-1.4 \times 10^{-3} \pm \sqrt{(1.4 \times 10^{-3})^2 - (4)(1)(-2.8 \times 10^{-6})}}{2(1)}$$

$$\underline{x} = 1.1 \times 10^{-3} = [\text{H}_3\text{O}^{\oplus}]$$

$$\text{pH} = -\log 1.1 \times 10^{-3} = \boxed{2.96}$$