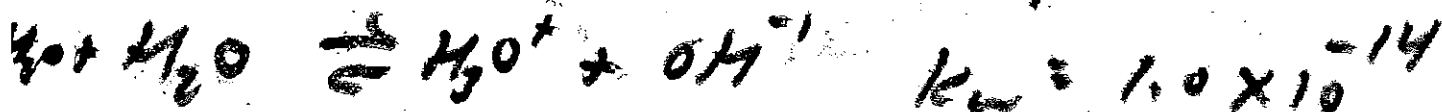
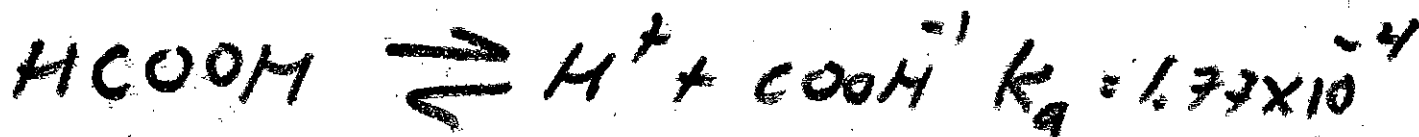


Example 14.5 C The pH of a Mixture of Weak Acids

Calculate the pH of a mixture of 2.00 M formic acid (HCOOH , $K_a = 1.77 \times 10^{-4}$) and 1.50 M hypobromous acid (HOBr , $K_a = 2.06 \times 10^{-9}$). What are the concentrations of both the hypobromite ion (OBr^-) and hydroxide (OH^-) ion at equilibrium?



$$K_a = \frac{[\text{H}^+][\text{COOH}^-]}{[\text{HCOOH}]}$$

Assume: $2.00\text{M} - x \approx 2.00\text{M}$

HCOOH	$\frac{x}{2.00\text{M}}$	$\frac{x}{2.00\text{M} - x}$
COOH^-	0	x
H^+	0	x

$$[\text{OBr}^-] = [\text{H}^+] = 5.55 \times 10^{-5} \text{ M}$$

$$.005 \times 10^{-2} \text{ M}$$

$$1.77 \times 10^{-4} = \frac{x}{2.00\text{M}}$$

$$x = \sqrt{(2.00\text{M})(1.77 \times 10^{-4})}$$

$$x = 1.88 \times 10^{-2} \text{ M}$$

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

$$\text{pH} = -\log(1.88 \times 10^{-2} \text{ M}) = 1.7258 = \boxed{1.726}$$