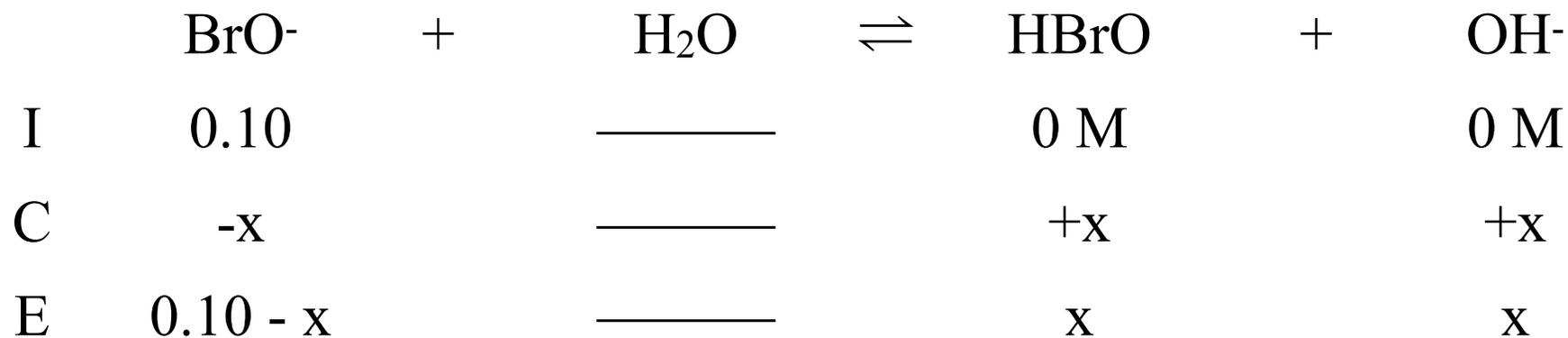


16.83a) In a NaBrO solution, the Na<sup>+</sup> ion does not react with the water. The BrO<sup>-</sup> (the conjugate base of HBrO) acts as a base toward water.



$$K_b = \frac{[\text{HBrO}][\text{OH}^-]}{[\text{BrO}^-]} \quad 4.00 \times 10^{-6} = \frac{x^2}{0.10 - x} \approx \frac{x^2}{0.10 - x}$$

$$x = 0.00063$$

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

$$\text{pOH} = -\log[0.00063]$$

$$\text{pOH} = 3.20$$

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

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

$$\text{pH} = 14 - 3.20 = 10.80$$

- 16.87 a) acidic;  $\text{NH}_4^+$  is a weak acid,  $\text{Br}^-$  is negligible  
b) acidic;  $\text{Fe}^{+3}$  is a weak acid,  $\text{Cl}^-$  is negligible  
c) basic;  $\text{Na}^+$  is a negligible,  $\text{CO}_3^{2-}$  is a weak base  
d) neutral;  $\text{K}^+$  is a negligible,  $\text{ClO}_4^-$  is negligible  
e) acidic;  $\text{Na}^+$  is a negligible,  $\text{HC}_2\text{O}_4^-$  is amphoteric. Its  $K_a$  is  $6.4 \times 10^{-5}$ , meaning that this ion tends to function as an acid ( $K_a > 10^{-7}$ )

- 16.88 a) acidic;  $\text{Al}^+$  is a weak acid,  $\text{Cl}^-$  is negligible  
b) neutral;  $\text{Na}^+$  is a negligible,  $\text{Br}^-$  is negligible  
c) basic;  $\text{Na}^+$  is a negligible,  $\text{ClO}^-$  is a weak base  
d) acidic;  $[\text{CH}_3\text{NH}_3]^+$  is a weak acid,  $\text{NO}_3^-$  is negligible  
e) basic;  $\text{Na}^+$  is a negligible,  $\text{SO}_3^{2-}$  is a weak base

16.91) Reviewing our three possible solutes, NaF solution will be basic, since  $\text{Na}^+$  is negligible and  $\text{F}^-$  is basic toward water. NaCl solution will be neutral since  $\text{Na}^+$  and  $\text{Cl}^-$  are both negligible. NaOCl solution will be basic, since  $\text{Na}^+$  is negligible and  $\text{OCl}^-$  is basic toward water. Since the pH of the solution is 8.08 (slightly basic) we know it can't be NaCl. Looking at the two other candidates, we know that HF is a stronger acid than HOCl. As such  $\text{F}^-$  is a weaker conjugate base than  $\text{OCl}^-$ , leading us to suspect the solution is NaF.

16.92 This salt solution must contain KBr, since this is the only salt listed which contains a cation and anion which are both the negligible conjugates of a strong acid and strong base.