

ANSWERS TO "TRY YOURSELF" PROBLEMS FROM STUDY SECTION 8.3

Try Yourself 8.3 a

Calculate the pH of the following solutions:

1. 0.0295 M HNO₃ (Strong acid)
2. 0.040 M NaOH (Strong Base)

1. $\text{pH} = -\log[\text{H}_3\text{O}^+] = -\log 0.0295 = 1.53$

2. $\text{pOH} = -\log[\text{OH}^-] = -\log 0.040 = 1.39$
 $\text{pH} = 14.00 - \text{pOH} = 14.00 - 1.39 = 12.61$

Try Yourself 8.3 b

An aqueous solution has a pH of 3.75. What is the hydronium ion and hydroxide ion concentrations of the solution?

$$\text{pH} = 3.75$$

$$[\text{H}_3\text{O}^+] = 10^{\text{pH}} = 10^{-3.75}$$

$$[\text{H}_3\text{O}^+] = 0.0001778 \text{ M } (1.78 \times 10^{-4} \text{ M})$$

$$[\text{H}_3\text{O}^+][\text{OH}^-] = 1.0 \times 10^{-14}$$

$$[\text{OH}^-] = 1.0 \times 10^{-14} / 1.78 \times 10^{-4} = 5.62 \times 10^{-11} \text{ M}$$

Try Yourself 8.3 c

An aqueous solution has a pH of 9.65. What is the hydronium ion and hydroxide ion concentrations of the solution?

$$\text{pH} = 9.65$$

$$[\text{H}_3\text{O}^+] = 10^{\text{pH}} = 10^{-9.65}$$

$$[\text{H}_3\text{O}^+] = 2.24 \times 10^{-10} \text{ M}$$

$$[\text{H}_3\text{O}^+][\text{OH}^-] = 1.0 \times 10^{-14}$$

$$[\text{OH}^-] = 1.0 \times 10^{-14} / 2.24 \times 10^{-10} = 4.46 \times 10^{-5} \text{ M}$$