

**CHAPTER 16 REVIEW***Acid-Base Titration and pH***SECTION 16-1****SHORT ANSWER** Answer the following questions in the space provided.**1.** Calculate the following values: (A calculator should not be necessary.)

- \_\_\_\_\_ a. If the  $[\text{H}_3\text{O}^+] = 1 \times 10^{-6} \text{ M}$  for a solution, calculate the  $[\text{OH}^-]$ .
- \_\_\_\_\_ b. If the  $[\text{H}_3\text{O}^+] = 1 \times 10^{-9} \text{ M}$  for a solution, calculate the  $[\text{OH}^-]$ .
- \_\_\_\_\_ c. If the  $[\text{OH}^-] = 1 \times 10^{-12} \text{ M}$  for a solution, calculate the  $[\text{H}_3\text{O}^+]$ .
- \_\_\_\_\_ d. If the  $[\text{OH}^-]$  in part c is reduced by half, to  $0.5 \times 10^{-12} \text{ M}$ , calculate the  $[\text{H}_3\text{O}^+]$ .
- \_\_\_\_\_ e. The  $[\text{H}_3\text{O}^+]$  and  $[\text{OH}^-]$  are \_\_\_\_\_ (directly, inversely, or not) proportional in any system involving water.

**2.** Calculate the following values: (A calculator should not be necessary.)

- \_\_\_\_\_ a. If the  $\text{pH} = 2.0$  for a solution, calculate the  $\text{pOH}$ .
- \_\_\_\_\_ b. If the  $\text{pOH} = 4.73$  for a solution, calculate the  $\text{pH}$ .
- \_\_\_\_\_ c. If the  $[\text{H}_3\text{O}^+] = 1 \times 10^{-3} \text{ M}$  for a solution, calculate the  $\text{pH}$ .
- \_\_\_\_\_ d. If the  $\text{pOH} = 5.0$  for a solution, calculate the  $[\text{OH}^-]$ .
- \_\_\_\_\_ e. If the  $\text{pH} = 1.0$  for a solution, calculate the  $[\text{OH}^-]$ .

**3.** Calculate the following values:

- \_\_\_\_\_ a. If the  $[\text{H}_3\text{O}^+] = 2.34 \times 10^{-5} \text{ M}$  for a solution, calculate the  $\text{pH}$ .
- \_\_\_\_\_ b. If the  $\text{pOH} = 3.5$  for a solution, calculate the  $[\text{OH}^-]$ .
- \_\_\_\_\_ c. If the  $[\text{H}_3\text{O}^+] = 4.6 \times 10^{-8} \text{ M}$  for a solution, calculate the  $[\text{OH}^-]$ .

**PROBLEMS** Write the answer on the line to the left. Show all your work in the space provided.**4.** The  $[\text{H}_3\text{O}^+] = 2.3 \times 10^{-3} \text{ M}$  for an aqueous solution.

- \_\_\_\_\_ a. Calculate  $[\text{OH}^-]$  in this solution.

**SECTION 16-1 continued**

\_\_\_\_\_ b. Calculate the pH of this solution.

\_\_\_\_\_ c. Calculate the pOH of this solution.

d. Is the solution acidic, basic, or neutral? Explain your answer.

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5. Consider a dilute solution of 0.025 M Ba(OH)<sub>2</sub> to answer the following questions.

a. What is the [OH<sup>-</sup>] of this solution? Explain your answer.

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\_\_\_\_\_ b. What is the pH of this solution?

6. Vinegar purchased in a store may contain 6 g of CH<sub>3</sub>COOH per 100 mL of solution.

\_\_\_\_\_ a. What is the molarity of the solute?

b. The actual [H<sub>3</sub>O<sup>+</sup>] of the vinegar solution in part a is  $4.2 \times 10^{-3}$  M. In this solution, has more than 1% or less than 1% of the acetic acid ionized? Explain your answer.

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\_\_\_\_\_ c. Is acetic acid strong or weak, based on the ionization information from part b?

\_\_\_\_\_ d. What is the pH of this vinegar solution?