CHAPTER REVIEW

Properties of Acids and Bases

SECTION 1 REVIEW

1. Compare the general properties of acids with the general properties of bases.
2. a. Distinguish between binary acids and oxyacids in terms of their component elements and the systems used in naming them.
   b. Give three examples of each type of acid.
3. Identify and describe the characteristic properties of five common acids used in industry. Give some examples of the typical uses of each.
4. Although HCl(*aq*) exhibits properties of an Arrhenius acid, pure HCl gas and HCl dissolved in a nonpolar solvent exhibit none of the properties of an Arrhenius acid. Explain why.
5. a. What distinguishes strong acids from weak acids?
   b. Give two examples each of strong acids and weak acids.
6. H_3PO_4, which contains three hydrogen atoms per molecule, is a weak acid, whereas HCl, which contains only one hydrogen atom per molecule, is a strong acid. Explain why.
7. a. What determines the strength of an Arrhenius base?
   b. Give one example each of an aqueous solution of a strong base and an aqueous solution of a weak base.

PRACTICE PROBLEMS

8. Name each of the following binary acids:
   a. HCl
   b. H_2S
9. Name each of the following oxyacids:
   a. HNO_3
   b. H_2SO_3
   c. $HClO_3$
   d. HNO_2
10. Write formulas for the following binary acids:
    a. hydrofluoric acid
    b. hydriodic acid
11. Write formulas for the following oxyacids:
    a. perbromic acid
    b. chlorous acid
    c. phosphoric acid
    d. hypochlorous acid

Acid-Base Theories

SECTION 2 REVIEW

12. Distinguish between a monoprotic, a diprotic, and a triprotic acid. Give an example of each.
13. Which of the three acid definitions is the broadest? Explain.

PRACTICE PROBLEMS

14. a. Write the balanced equations that describe the two-step ionization of sulfuric acid in a dilute aqueous solution.
    b. How do the degrees of ionization in the two steps compare?
15. Dilute HCl(*aq*) and KOH(*aq*) are mixed in chemically equivalent quantities. Write the following:
    a. formula equation for the reaction
    b. overall ionic equation
    c. net ionic equation
16. Repeat item 15, but mix $H_3PO_4(aq)$ and NaOH(*aq*).
17. Write the formula equation and net ionic equation for each of the following reactions:
    a. $Zn(s) + HCl(aq) \longrightarrow$
    b. $Al(s) + H_2SO_4(aq) \longrightarrow$
18. Write the formula equation and net ionic equation for the reaction between Ca(*s*) and HCl(*aq*).

Acid-Base Reactions

SECTION 3 REVIEW

19. Define and give an equation to illustrate each of the following substances:
    a. a conjugate base
    b. a conjugate acid
20. a. What is the relationship between the strength of an acid and the strength of its conjugate base?
    b. What is the relationship between the strength of a base and the strength of its conjugate acid?