Assessment

Chapter Test B

Chapter: Acids and Bases

PART I In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- **1.** Which of the following is an oxyacid? a. HCl **b.** H₂O c. H_2S **d.** H_2SO_4 **2.** Which acid is produced in the stomach? a. HNO₃ **b.** CH₃COOH c. H_2SO_4 **d.** HCl **3.** Which of the following is a strong base? a. NH₂ c. NaOH **b.** aniline **d.** acetate ion **4.** In the reaction represented by the equation $HF(aq) + H_2O(l) \Leftrightarrow$ $H_{3}O^{+}(aq) + F^{-}(aq)$, a conjugate acid-base pair is **a.** F^- and H_2O . **c.** HF and F^- . **b.** H_3O^+ and HF. **d.** HF and H_2O . **5.** If H_2O in the reaction represented by the equation $H_2O + C_2H_3COOH \Leftrightarrow$ $H_3O^+ + C_2H_3COO^-$ is considered to be a weaker base, then H_3O^+ is a **a.** stronger acid. **c.** weaker acid. **b.** stronger base. **d.** weaker base. 6. Proton-transfer reactions favor production of the **a.** stronger acid and stronger base. **b.** weaker acid and weaker base. **c.** stronger acid and weaker base. **d.** weaker acid and stronger base. 7. Aqueous solutions of most bases contain **a.** hydroxide ions and cations. **c.** hydrogen ions and anions. **b.** hydroxide ions and anions. **d.** hydrogen ions and cations. **8.** Acid strength increases with **a.** increasing polarity and increasing bond strength. **b.** increasing polarity and decreasing bond strength. **c.** decreasing polarity and increasing bond strength.
 - **d.** decreasing polarity and decreasing bond strength.

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Name	Class	Date	
Chapter Test B, continued			
PART II Write the correct term (or term	ns) in the space prov	ided.	
9. A substance that ionizes almost co	ompletely in aqueous	solutions, producing	
H_3O^+ ions, is $a(n)$		acid.	
10. An acid that contains hydrogen an	d only one other ele	ment is called a(n)	
	_ acid.		
11. The species that forms when an ac	cid has given up a pr	oton is called the	
acid's	·		
12. An acid that can donate two proto	ns per molecule is c	alled a(n)	
	_ acid.		
13. Bases are said to be neutralized with	hen they react with		
	_ to yield		
	_ and a(n)		
14. Any species that can react as eithe	er an acid or a base i	s described as	
15. Barium carbonate will react with hydrochloric acid to produce			
	,	,	
and			
PART III Write the name of each of the followin	g acids in the space	provided.	
16	$_$ HNO ₂		
17	_ HCl		
18	$-H_2CO_3$		
19	- H ₂ SO ₄		
20	_ HI		
21	HBrO		

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Name	Class	Date
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Chapter Test B, continued

Write the formula for each of the following acids in the space provided.

22	hydrosulfuric acid
23	nitric acid
24	phosphorous acid
25	perchloric acid

Refer to the equation below to answer questions 26 and 27.

 $\operatorname{HCl}(g) + \operatorname{NH}_3(l) \hookrightarrow \operatorname{NH}_4^+(aq) + \operatorname{Cl}^-(aq)$

26. List the conjugate acid-base pairs.

27. Identify each reactant and product as acidic or basic.

Refer to the equation below to answer questions 28 and 29.

$$H_2O(l) + NH_3(g) \hookrightarrow NH_4^+(aq) + OH^-(aq)$$

28. List the conjugate acid-base pairs.

29. Identify each reactant and product as a proton donor or a proton acceptor.

Name	Class	Date
Chapter Test B, continued		
Defer to the following state	mont to answer questions	70.70
Refer to the following state		5 50-52.
Dilute $HCl(aq)$ a quantities.	and NaOH(aq) are mixed i	in chemically equivalent
30. Write the chemical equa	ation for the reaction.	
31. Write the overall ionic of	equation for the reaction.	
32. Write the net ionic equa	ation.	
Use the following three aci	ds to answer questions 33	and 34:
iodic acid	hypoiodous acid	periodic acid
33. Give the formulas for the formulas for the formula of the fo	hese three acids.	
34. List the acids in order of	of increasing acid strength	l.

Name	Class	Date
Chapter Test B, continued		
PART IV Write the answers t	o the following questio	ns in the space provided.
35. Explain the difference be	tween strong acids and	l weak acids.
36. Explain how the product can result in acid rain. W	ion of sulfur trioxide, S rite an equation for the	O ₃ , in industrial processes reaction.
37. List five properties of aqu	ieous acids.	
38. Write the balanced equation phosphoric acid in a dilute	ions that describe the t te aqueous solution.	hree-stage ionization of

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dissolves. The ions, already present, separate from one another. Ionization is the process of forming ions from the solute molecules by the action of the solvent. When a molecular compound dissolves and ionizes in a polar solvent, ions are formed.

- **21.** In a strong electrolyte, all or almost all of the dissolved compound exists as ions in aqueous solution. In a weak electrolyte, little of the dissolved compound exists as ions in aqueous solution.
- **22.** When a compound containing hydrogen dissolves in water to form a hydrogen ion, H⁺, the H⁺ ion attracts other molecules or ions so strongly that it rarely exists alone. In water, the H⁺ ion immediately bonds to a water molecule, forming a hydronium ion, $H_{3}O^{+}$.
- **23.** Dissolved salt will lower the freezing point of water. Therefore, adding salt to icy roads will help melt the ice and prevent further freezing of any water on the road's surface. It will also prevent the refreezing of water as it melts.
- **24.** none
- **25.** $\operatorname{Ba}^{2+}(aq) + \operatorname{SO}_{4}^{2-}(aq) \to \operatorname{BaSO}_{4}(s)$ **26.** $\operatorname{Cd}^{2+}(aq) + \operatorname{S}^{2-}(aq) \to \operatorname{CdS}(s)$
- **27.** none
- **28.** none
- **29.** 42 g/mol
- **30.** 0.77°C/*m*
- **31.** -0.261°C
- **32.** -2.81°C/m
- **33.** 690 g **34.** 0.73°C
 - 4 Acids and Bases,

pp. 125-133

TEST A

1. b	2. c
3. a	4. d
5. b	6. c
7. b	8. d
9. b	10. c
11. b	12. a
13. a	14. d
15. с	16. a

17. с	18. a
19. b	20. a
21. d	22. c
23. c	24. b
25. a	

TEST B

1. d	2. d
3. с	4. c
5. a	6. b
7. a	8. b

- 9. strong
- 10. binary
- **11.** conjugate base
- 12. diprotic
- 13. acids, water, salt
- 14. amphoteric
- 15. carbon dioxide, barium chloride, water
- 16. nitrous acid
- 17. hydrochloric acid
- 18. carbonic acid
- **19.** sulfuric acid
- 20. hydriodic acid
- **21.** hypobromous acid
- 22. H₂S
- **23.** HNO₃
- **24.** H₃PO₃
- **25.** HClO₄
- **26.** HCl and Cl^{-} NH_3 and NH_4^+
- **27.** acidic: HCl and NH_4^+ basic: NH₃ and Cl
- **28.** H_2O and OH NH_3 and NH_4^+
- **29.** proton donors: H_2O and NH_4^+ proton acceptors: OH⁻ and NH₃
- **30.** $HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) +$ $H_2O(l)$
- **31.** $H_3O^+(aq) + Cl^-(aq) + Na^+(aq) +$ $OH^{-}(aq) \rightarrow Na^{+}(aq) + Cl^{-}(aq) +$ $2H_2O(l)$

32.
$$H_3O^+(aq) + OH^-(aq) \rightarrow 2H_2O(l)$$

- **33.** HIO₃, HIO, HIO₄
- **34.** HIO, HIO₃, HIO₄
- **35.** A strong acid ionizes completely in an aqueous solution. A weak acid does not ionize completely in aqueous solution. Its aqueous solution contains hydronium ions, anions, and dissolved acid molecules.
- **36.** Sulfur trioxide, SO_3 , is produced as a gas and dissolves in atmospheric

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water to produce a sulfuric acid solution that falls to the ground as rain or snow. $SO_3(g) + H_2O(l) \rightarrow H_2SO_4(aq)$

- **37.** Have a sour taste; change the color of acid-base indicators; some react with active metals to release hydrogen gas; react with bases to produce salts and water; conduct electric current
- **38.** $\operatorname{H_3PO}_4(aq) + \operatorname{H_2O}(l) \rightleftharpoons \operatorname{H_3O^+}(aq) + \operatorname{H_2PO}_4^-(aq)$ $\operatorname{H_3O^+}(aq) + \operatorname{H_2PO}_4^-(aq)$ $\operatorname{H_2PO}_4^-(aq) + \operatorname{H_2O}(l) \rightleftharpoons \operatorname{H_3O^+}(aq) + \operatorname{HPO}_4^{2^-}(aq)$ $\operatorname{HPO}_4^{2^-}(aq) + \operatorname{H_2O}(l) \rightleftharpoons \operatorname{H_3O^+}(aq) + \operatorname{PO}_4^{3^-}(aq)$

15 Acid-Base Titration and pH, pp. 134–143

TEST A

1. d	2. c
3. b	4. c
5. c	6. c
7. b	8. b
9. d	10. b
11. с	12. b
13. a	14. d
15. d	16. d
17. d	18. a
19. c	20. c
21. d	22. b
23. с	24. d
25. d	

TEST B

1. d **2.** b **3.** d **4.** c **5.** a **6**. b **7.** a **8.** d **9.** self-ionization **10.** basic **11.** transition interval 12. pH **13.** 10^{-14} **14.** 14 15. decreases **16.** end point hig 17. 18 19 20 2 22

- **23.** acidic
- **24.** basic
- **25.** basic
- **26.** A pH meter measures the pH of a solution by measuring the voltage between the two electrodes that are placed in the solution. This works because the voltage is proportional to the hydronium ion concentration.
- **27.** The pH changes slowly at first, then rapidly through the equivalence point, then slowly again.
- 28. HIn + H₂O → H₃O⁺ + In⁻ or HIn ⇒ H⁺ + In⁻
 In acidic solutions, the H₃O⁺ ions in solution drive the equation toward the nonionized form. HIn is present in largely nonionized form in acidic solutions, and In⁻ ions are present in largely ionized form in basic solutions. HIn is a different color than the In⁻ ion.
- **29.** acidic
- **30.** neutral
- **31.** basic
- **32.** basic
- **33.** basic
- **34.** $[H_3O^+] = 1 \times 10^{-4} \text{ M};$ $[OH^-] = 1 \times 10^{-10} \text{ M}$
- **35.** $[H_3O^+] = 1.0 \times 10^{-10} \text{ M};$ $[OH^-] = 1.0 \times 10^{-4} \text{ M}$
- **36.** $[H_3O^+] = 5.0 \times 10^{-11} \text{ M};$ $[OH^-] = 2.0 \times 10^{-4} \text{ M}$
- **37.** $[H_3O^+] = 1 \times 10^{-4} M;$ $[OH^-] = 1 \times 10^{-10} M$
- **38.** $[H_3O^+] = 5 \times 10^{-3} \text{ M};$ $[OH^-] = 2 \times 10^{-12} \text{ M}$
- **39.** 1×10^{-5} M
- **40.** 4.0
- **41.** 2.5×10^{-2} M
- **42.** 0.232 M
- **43.** 2.01 M
- **44.** 0.0175 M

16 Reaction Energy,

pp. 144-153

I. nigher		
B. lower	TEST A	
9. primary standard	1. d	2. a
0. higher	3. c	4. a
1. acidic	5. b	6. c
2. acidic	7. a	8. a

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