

ACID-BASE THEORIES

Section Review

Objectives

- Define the properties of acids and bases
- Compare and contrast acids and bases as defined by the theories of Arrhenius, Brønsted-Lowry, and Lewis

Vocabulary

- monoprotic acids
- diprotic acids
- triprotic acids
- conjugate acid

- conjugate base
- conjugate acid-base pair
- hydronium ion (H₃O⁺)
- amphoteric
- · Lewis acid
- Lewis base

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

Compounds can be classified as acids or bases according to	ı.	5
1 different theories. An2 acid yields hydrogen ions	2.	Anhenius
in aqueous solution. An Arrhenius base yields in aqueous	3.	hydroxide cons
solution. A Brønsted-Lowry acid is a4 donor. A Brønsted-	4.	proton 4+
Lowry base is a proton5 In the Lewis theory, an acid is an		acceptor
6 acceptor. A Lewis base is an electron-pair 7.	6.	electron Pair
An acid with one ionizable hydrogen atom is called a8	7	denor
acid, while an acid with two ionizable hydrogen atoms is called a	8.	Monoprotic
9 acid.	9.	diprotic .
A is a pair of substances related by the gain or loss of	10.	Conjugate and base pair
a hydrogen ion. A substance that can act as both an acid and a base		
is called 11		,

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- NT 12. Hydrochloric acid is a strong acid that is diprotic.
- NT_{4} 13. The ammonium ion, NH_{4}^{+} , is a Brønsted-Lowry base.
- 14. A Brønsted-Lowry base is a hydrogen-ion acceptor.
- $\mathcal{S}_{\mathcal{T}}$ 15. A compound can act as both an acid and a base.
- AT 16. PBr₃ is a Lewis base.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A

$\frac{\mathcal{G}}{n}$ 17. monoprotic acids

- ______18. triprotic acids
- ______19. acid properties
- 21. conjugate base
- 22. conjugate acid
- \mathcal{L} 23. hydronium ion (H_3O^+)
- **25.** Lewis base

Column B

- a. tastes sour and will change the color of an acid-base indicator
- b. an electron-pair donor
- c. a water molecule that gains a hydrogen ion
- d. acids that contain three ionizable hydrogens
- **e.** particle that remains when an acid has donated a hydrogen ion
- f. an electron-pair acceptor
- g. acids that contain one ionizable hydrogen
- h. tastes bitter and feels slippery
- i. particle formed when a base gains a hydrogen ion

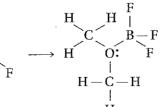
Part D Problem

Answer the following in the space provided.

26. Identify the Lewis acid and Lewis base in the following reaction. Explain.

donates a pair o

$$H - C \qquad C - H \qquad H \qquad H$$



dimethyl ether

boron trifluoride

Caccepts pair of e