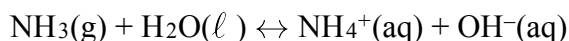


1. Which statement describes one acid-base theory?

- A) An acid is an  $H^+$  acceptor, and a base is an  $H^+$  donor.
- B) An acid is an  $H^+$  donor, and a base is an  $H^+$  acceptor.
- C) An acid is an  $H^-$  acceptor, and a base is an  $H^-$  donor.
- D) An acid is an  $H^-$  donor, and a base is an  $H^-$  acceptor.

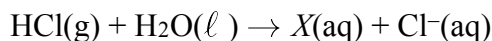
2. Given the equation representing a reversible reaction:



According to one acid-base theory, the reactant that donates an  $H^+$  ion in the forward reaction is

- A)  $NH_3(g)$
- B)  $H_2O(\ell)$
- C)  $NH_4^+(aq)$
- D)  $OH^-(aq)$

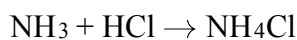
3. Given the equation:



Which ion is represented by  $X$ ?

- A) hydroxide
- B) hydronium
- C) hypochlorite
- D) perchlorate

4. Given the reaction:



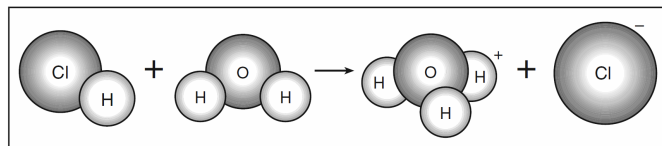
In this reaction ammonia molecules ( $NH_3$ ) act as a base because they

- A) accept hydrogen ions ( $H^+$ )
- B) accept hydroxide ions ( $OH^-$ )
- C) donate hydrogen ions ( $H^+$ )
- D) donate hydroxide ions ( $OH^-$ )

5. According to one acid-base theory,  $NH_3$  acts as a base when an  $NH_3$  molecule

- A) accepts an  $H^+$  ion
- B) donates an  $H^+$  ion
- C) accepts an  $OH^-$  ion
- D) donates an  $OH^-$  ion

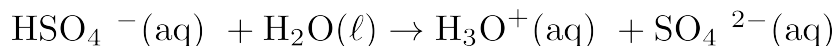
6. Given the diagram representing a reaction:



According to one acid-base theory, the water acts as

- A) a base because it accepts an  $H^+$
- B) a base because it donates an  $H^+$
- C) an acid because it accepts an  $H^+$
- D) an acid because it donates an  $H^+$

7. Given the balanced equation representing a reaction:



According to one acid-base theory, the  $\text{H}_2\text{O} (\ell)$  molecules act as

- A) a base because they accept  $\text{H}^+$  ions      B) a base because they donate  $\text{H}^+$  ions  
C) an acid because they accept  $\text{H}^+$  ions      D) an acid because they donate  $\text{H}^+$  ions

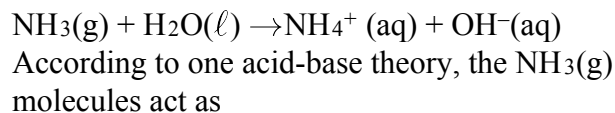
8. One acid-base theory defines a base as an

- A)  $\text{H}^+$  donor      B)  $\text{H}^+$  acceptor  
C) H donor      D) H acceptor

9. One alternate acid-base theory states that an acid is an

- A)  $\text{H}^+$  donor      B)  $\text{H}^+$  acceptor  
C)  $\text{OH}^-$  donor      D)  $\text{OH}^-$  acceptor

10. Given the balanced equation representing a reaction:

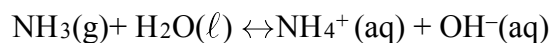


- A) an acid because they accept  $\text{H}^+$  ions  
B) an acid because they donate  $\text{H}^+$  ions  
C) a base because they accept  $\text{H}^+$  ions  
D) a base because they donate  $\text{H}^+$  ions

11. Which statement describes an alternate theory of acids and bases?

- A) Acids and bases are both  $\text{H}^+$  acceptors.  
B) Acids and bases are both  $\text{H}^+$  donors.  
C) Acids are  $\text{H}^+$  acceptors, and bases are  $\text{H}^+$  donors.  
D) Acids are  $\text{H}^+$  donors, and bases are  $\text{H}^+$  acceptors.

12. Given the equation representing a reaction at equilibrium:



The  $\text{H}^+$  acceptor for the forward reaction is

- A)  $\text{H}_2\text{O} (\ell)$       B)  $\text{NH}_3 (\text{g})$   
C)  $\text{NH}_4^+ (\text{aq})$       D)  $\text{OH}^- (\text{aq})$

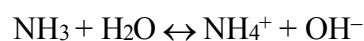
13. One acid-base theory states that an acid is

- A) an  $\text{H}^-$  donor      B) an  $\text{H}^-$  acceptor  
C) an  $\text{H}^+$  donor      D) an  $\text{H}^+$  acceptor

14. One acid-base theory states that an acid is

- A) an electron donor      B) a neutron donor  
C) an  $\text{H}^+$  donor      D) an  $\text{OH}^-$  donor

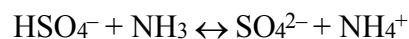
15. Given the reaction:



The water acts as the

- A) base      B) acid  
C) proton acceptor      D) electron donor

16. Given the reaction at equilibrium:



What are the two species that are acids?

- A)  $\text{NH}_3$  and  $\text{NH}_4^+$       B)  $\text{NH}_3$  and  $\text{SO}_4^{2-}$   
C)  $\text{HSO}_4^-$  and  $\text{SO}_4^{2-}$       D)  $\text{HSO}_4^-$  and  $\text{NH}_4^+$

17. Given the reaction at equilibrium:



Which species acts as base by accepting a proton in the forward reaction?

- A)  $\text{S}^{2-}$       B)  $\text{H}_2\text{O}$       C)  $\text{HS}^-$       D)  $\text{OH}^-$

18. Given the reaction:



The  $\text{H}_2\text{O}$  molecule serves as a

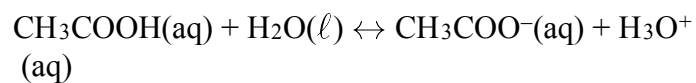
- A) weak base      B) strong base  
C) proton donor      D) proton acceptor

---

19. According to an "alternative theory", H<sub>2</sub>O is considered to be a base when it

- A) donates an electron
- B) accepts an electron
- C) donates a proton
- D) accepts a proton

20. Given the reaction:



In this reaction, which substances are accepting protons?

- A) CH<sub>3</sub>COOH(ag) and H<sub>2</sub>O(*l*)
  - B) CH<sub>3</sub>COOH(ag) and CH<sub>3</sub>COO<sup>-</sup>(ag)
  - C) H<sub>2</sub>O(*l*) and H<sub>3</sub>O<sup>+</sup>(ag)
  - D) H<sub>2</sub>O(*l*) and CH<sub>3</sub>COO<sup>-</sup>(aq)
-