

APOLLO

Proton transfer reactions

SL

Chemistry

First assessment 2025

13 questions | questions

25. Which two species can be both Brønsted–Lowry acids and Brønsted–Lowry bases?

- A. H_3PO_4 and PO_4^{3-}
- B. HPO_4^{2-} and H_2PO_4^-
- C. HPO_4^{2-} and PO_4^{3-}
- D. PO_4^{3-} and H_2PO_4^-

- 26.** A solution has a pH of 3.0. What is the hydrogen ion concentration in the solution in mol dm^{-3} ?
- A. 3.0×10^{-3}
 - B. 1.0×10^{-3}
 - C. 1.0×10^3
 - D. 3.0×10^3

24. What is required to convert a base into its conjugate acid?

- A. A negative charge
- B. A hydrogen atom
- C. An electron pair
- D. A proton

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25. Which solution has a pH of 9.0?

- A. $10^{-9} \text{ mol dm}^{-3} \text{ NH}_3(\text{aq})$
- B. $10^{-9} \text{ mol dm}^{-3} \text{ NaOH}(\text{aq})$
- C. $10^{-5} \text{ mol dm}^{-3} \text{ NH}_3(\text{aq})$
- D. $10^{-5} \text{ mol dm}^{-3} \text{ NaOH}(\text{aq})$

- 26.** What is the main reason why sulfuric acid has a lower pH than methanoic acid of the same concentration?
- A. Sulfuric acid is diprotic, whereas methanoic acid is monoprotic.
 - B. Sulfuric acid ionizes more than methanoic acid.
 - C. Sulfuric acid has a stronger conjugate base than methanoic acid.
 - D. Sulfuric acid is more soluble in water than methanoic acid.

24. What is the pH of $0.0010 \text{ mol dm}^{-3} \text{ HCl (aq)}$?

- A. 2.0
- B. 2.5
- C. 3.0
- D. 3.5

25. Which solution is acidic at 25 °C?

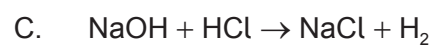
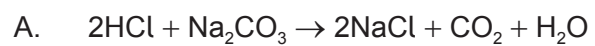
- A. $[\text{H}^+] = 1.0 \times 10^{-9} \text{ mol dm}^{-3}$
- B. $[\text{OH}^-] = 1.0 \times 10^{-13} \text{ mol dm}^{-3}$
- C. $[\text{OH}^-] = 1.0 \times 10^{-6} \text{ mol dm}^{-3}$
- D. $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-13} \text{ mol dm}^{-3}$

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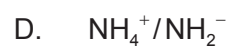
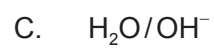
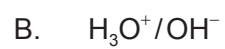
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26. Which equation correctly describes a chemical reaction?



30. Which is a conjugate acid–base pair?



25. In which of the following reactions does ammonia behave as a Brønsted–Lowry base?

- A. $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$
- B. $\text{NH}_3 + \text{H}_2\text{O} + \text{CO}_2 \rightarrow (\text{NH}_4)\text{HCO}_3$
- C. $\text{NH}_3 + \text{CH}_3\text{CH}_2\text{Cl} \rightarrow \text{CH}_3\text{CH}_2\text{NH}_2 + \text{HCl}$
- D. $2\text{NH}_3 + 2\text{K} \rightarrow 2\text{KNH}_2 + \text{H}_2$

24. What is the concentration of $\text{OH}^- (\text{aq})$, in mol dm^{-3} , in a solution at 298.15 K with a pH of 4.50?

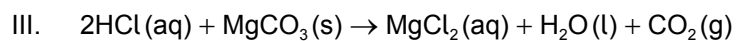
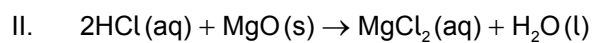
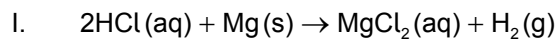
$$\text{pH} = -\log_{10} [\text{H}^+] \quad [\text{H}^+] = 10^{-\text{pH}} \quad K_w = [\text{H}^+] [\text{OH}^-] \quad K_w = 1.00 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6}$$

- A. 3.16×10^{-10}
- B. 3.16×10^{-9}
- C. 3.16×10^{-5}
- D. 3.16×10^{-4}

25. Which aqueous solution has the lowest pH?

- A. $1.0 \text{ mol dm}^{-3} \text{ HNO}_3$
- B. $2.0 \text{ mol dm}^{-3} \text{ HCl}$
- C. $1.0 \text{ mol dm}^{-3} \text{ CH}_3\text{COOH}$
- D. $2.0 \text{ mol dm}^{-3} \text{ NaOH}$

25. Which reactions involve the transfer of a proton?



- A. I and II only
B. I and III only
C. II and III only
D. I, II and III

Turn over