YEAR 12 SCIENCE

Acids, Bases & pH

Calculate pH and explain acid–base reactions (Chemistry)

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Formulas

pH = −log₁₀[H₃O⁺] [H₃O⁺] = 10^(−pH) At 25 °C: $[H_3O^+][OH^-] = 1.0 \times 10^{-14}$ and pH + pOH = 14

Calculate.

1. Find the pH when $[H_3O^+] = 1.0 \times 10^{-3}$ mol/L.

2. Find the pH of 0.010 mol/L HCl.

3. Find $[H_3O^+]$ when pH = 5.

4. Find the pH of 0.0010 mol/L NaOH.

5. A pH 2 solution is diluted by a factor of 10. What is the new pH?

6. How many times more acidic is pH 3 than pH 6?

Match each term to its definition.

7. Brønsted–Lowry acid ●
8. Brønsted–Lowry base ●
9. Strong acid ●
10. Conjugate base ●

- **a)** the species left after an acid donates a proton
- **b)** proton (H^+) acceptor
- **c)** proton (H^+) donor
- **d)** ionises completely in water

Write your answer.

11. Write the balanced equation for HCl reacting with NaOH.

12. Explain why 0.1 mol/L ethanoic acid has a higher pH than 0.1 mol/L HCl.

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Calculate.

1. pH = 3
2. pH = 2
3. 1.0×10^{-5} mol/L
4. pOH = 3, so pH = 11
5. pH = 3
6. 1000 times

Match each term to its definition.

7. c) proton (H^+) donor
8. b) proton (H^+) acceptor
9. d) ionises completely in water
10. a) the species left after an acid donates a proton

Write your answer.

11. $HCl + NaOH \rightarrow NaCl + H_2O$
12. Ethanoic acid is weak and only partially ionises, so $[H_3O^+]$ is lower.

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