What is Acid-Base Neutralization?

Worksheet

In neutralization, acid donates H+ ions and base donates OH ions. They react: H+ + OH H2O. The resulting salt solution can be neutral, slightly acidic, or slightly basic depending on the relative strength of the acid and base.

Questions

1. H+ + OH ?

A) HO
B) H2O
C) H2O2
D) H3O+

2. Neutralization always results in pH =

A) 5
B) 7
C) 9
D) depends on acid/base strength

3. Balanced: HCl + Ca(OH)2

A) CaCl + H2O
B) CaCl2 + H2O
C) Ca + Cl + H2O
D) CaCl + H2O2

4. Molar ratio in H2SO4 + KOH neutralization?

A) 1:1
B) 1:2
C) 2:1
D) 1:3

5. 50 mL of 0.1 M HCl is neutralized by NaOH. How much NaOH is needed?

6. Sulfuric acid (H2SO4) neutralized by potassium hydroxide (KOH). Balanced equation?

7. 0.02 mol of HNO3 reacts with 0.04 mol NaOH. Which is in excess?

8. Define: What happens when an acid meets a base?

9. Define: What is the pH of a neutralized solution?

10. Define: Write the neutralization of HCl and NaOH.

Answer Key

1. B) H2O - The products of acid-base neutralization combine to form water.

2. D) depends on acid/base strength - Though typically near 7, salts of weak acids/bases can shift pH slightly.

3. B) CaCl2 + H2O - 1 Ca(OH)2 has 2 OH groups, so 2 HCl needed: 2HCl + Ca(OH)2 CaCl2 + 2H2O

4. C) 2:1 - H2SO4 is diprotic (2 H+), KOH is monoprotic: H2SO4 + 2KOH K2SO4 + 2H2O

5. HCl + NaOH NaCl + H2O Moles of HCl = 0.050 L 0.1 M = 0.005 mol 1:1 molar ratio NaOH needed = 0.005 mol If NaOH is 0.1 M: V = 0.005/0.1 = 0.050 L = 50 mL

6. H2SO4 has 2 H+ ions, KOH has 1 OH Equation: H2SO4 + 2KOH K2SO4 + 2H2O 2:1 molar ratio for acid:base

7. HNO3 + NaOH NaNO3 + H2O (1:1 ratio) 0.02 mol HNO3 needs 0.02 mol NaOH 0.04 mol NaOH is supplied 0.02 mol NaOH in excess

8. H+ ions from acid combine with OH ions from base to form H2O and a salt.

9. Approximately 7 (neutral). It can vary slightly if the acid and base have different strengths.

10. HCl + NaOH NaCl + H2O