What is Acid-Base Titration?

Worksheet

At the equivalence point, moles of acid = moles of base: n(acid) = n(base). Using MV = MV, where M and V are the molarity and volume of one solution, and M and V are for the other.

MV = MV

Questions

1. 0.1 M HCl (30 mL) titrates 40 mL NaOH. [NaOH] = ?

A) 0.075 M
B) 0.1 M
C) 0.133 M
D) 0.2 M

2. At the equivalence point

A) Acid > base
B) Base > acid
C) Acid = base (moles)
D) Indicator disappears

3. Which indicator is best for strong acid-strong base titration?

A) Phenolphthalein
B) Methyl orange
C) Litmus
D) Neither works

4. In a titration, 15 mL of 0.2 M acid neutralizes 10 mL of unknown base. Base molarity?

A) 0.3 M
B) 0.2 M
C) 0.133 M
D) 0.5 M

5. A burette contains 0.2 M HCl. If 25 mL of HCl is used to titrate 30 mL of NaOH, find [NaOH].

6. 0.15 M HSO is titrated with 0.3 M NaOH. 20 mL of acid needed. Volume of base used?

7. 15 mL of unknown HCl is titrated with 0.1 M NaOH (25 mL). Find [HCl].

8. Define: What is titration used for?

9. Define: What is the equivalence point?

10. Define: Titration formula?

Answer Key

1. A) 0.075 M - MV = MV (0.1)(30) = M(40) M = 3/40 = 0.075 M.
2. C) Acid = base (moles) - Equivalence point = moles of acid exactly equals moles of base.
3. B) Methyl orange - Methyl orange (redyellow) is better for strong acid-strong base. Phenolphthalein works too but has a broader range.
4. A) 0.3 M - (0.2)(15) = M(10) M = 3/10 = 0.3 M (assuming 1:1 ratio).
5. HCl + NaOH NaCl + HO (1:1 ratio) MV = MV (0.2 M)(25 mL) = M(30 mL) M = 5 / 30 = 0.167 M
6. HSO + 2NaOH NaSO + 2HO (1:2 ratio) (0.15)(20) 2 = (0.3) V_NaOH 6 = 0.3 V_NaOH V_NaOH = 20 mL
7. MV = MV (0.1 M)(25 mL) = M_HCl(15 mL) M_HCl = 2.5 / 15 = 0.167 M
8. To find the concentration of an unknown solution by reacting it with a known solution.
9. The point where moles of acid = moles of base; indicated by a sharp color change of an indicator.
10. MV = MV - molarity and volume of known solution equals that of unknown.