

Acid-Base Titrations & Equivalence

STUDENT PRACTICE WORKSHEET

Name: _____ Date: _____

Directions: Circle the best answer for 1-6. Show your full reasoning and units for 7-8. Compare with the separate key after completing the page.

Part A — Concept checks

1. What defines the equivalence point?

- A. first color change B. stoichiometric amount of titrant added C. solution at pH 7 always
D. half the acid reacted

2. At 25 °C, ideal strong acid-strong base equivalence pH is approximately...

- A. 1 B. 5 C. 7 D. 11

3. 20.0 mL of 0.100 M HCl needs what volume of 0.100 M NaOH?

- A. 10.0 mL B. 20.0 mL C. 40.0 mL D. 100.0 mL

4. Which glassware precisely delivers a variable volume of titrant?

- A. beaker B. watch glass C. buret D. evaporating dish

5. Endpoint vs equivalence: which is correct?

- A. they are always identical B. endpoint is observed, equivalence is stoichiometric C.
equivalence is observed color D. endpoint is a mass

6. The net ionic reaction of HCl with NaOH is...

- A. $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$ B. $\text{Na}^+ + \text{Cl}^- \rightarrow \text{NaCl(s)}$ C. $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$ D. $\text{HCl(s)} \rightarrow \text{H}^+ + \text{Cl}^-$

Part B — Application and explanation

7. What volume of 0.100 M NaOH neutralizes 25.00 mL of 0.100 M HCl?

8. Explain why this guideline matters, with an example of what could go wrong if you ignore it: The indicator endpoint is an experimental observation; equivalence is a stoichiometric condition. Their difference contributes to titration error.

REFERENCE RELATIONSHIP

at strong monoprotic acid-base equivalence: $M_{\text{acid}} V_{\text{acid}} = M_{\text{base}} V_{\text{base}}$